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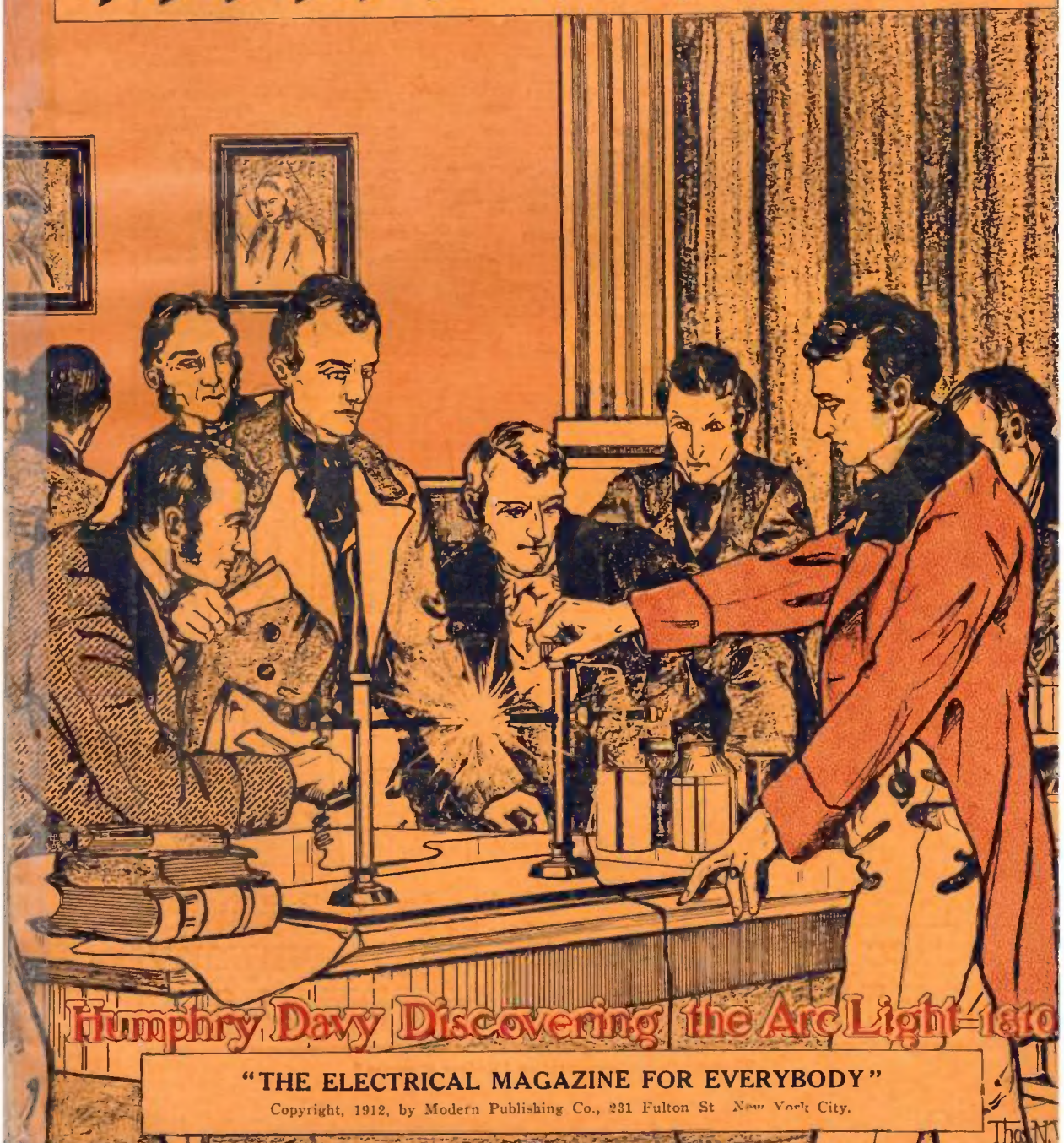

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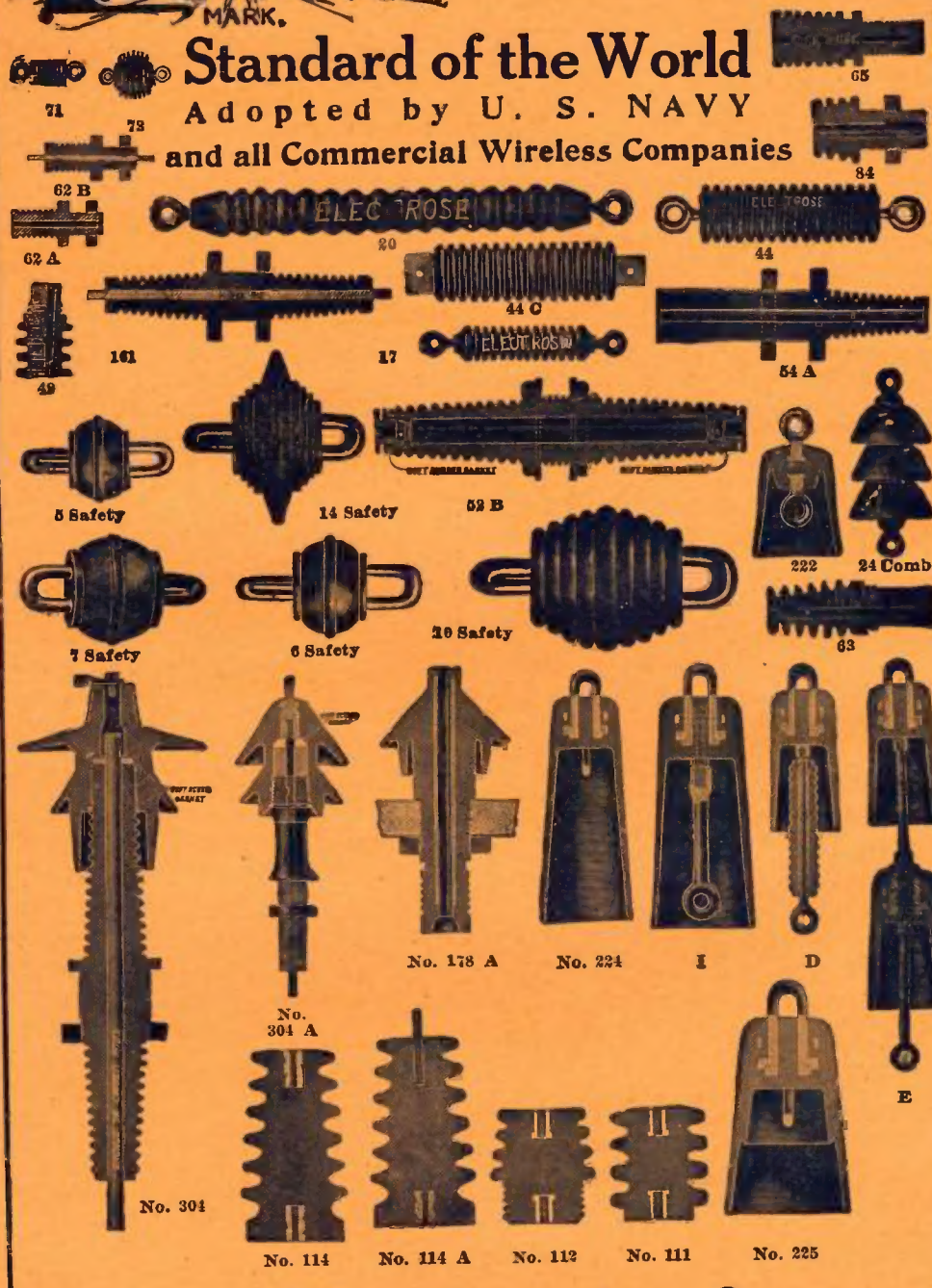

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MODERN ELECTRICS

"THE ELECTRICAL MAGAZINE FOR EVERYBODY"

Edited by H. Gernsback

Volume V DECEMBER, 1912 No. 9

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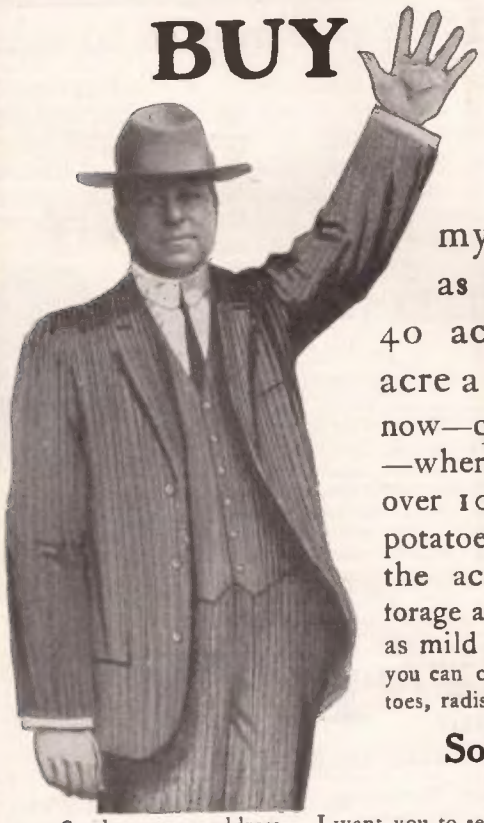

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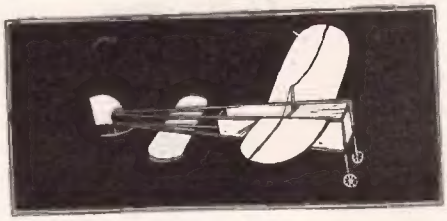

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VOL. V. DECEMBER, 1912 No. 9

The Practical Electrician

A Popular Course in Electricity on the Construction of Electrical Apparatus and Experiments to be Conducted with them

By PROFESSOR W. WEILER, of the University of Esslingen, (Germany)
Translated by H. GERNSBACK

CHAPTER IV

(Continued)

103. The Carbons

THE carbon rods of arc lamps are the same as the carbon plates for Galvanic batteries, and the filaments for incandescent lamps, an article of manufacture.

Very thin rods give more light than thick ones but are also consumed very rapidly. It is, therefore, necessary to choose a happy medium, and to bring about a proportion between the thickness of the rods and the intensity of the current. 100 volt amperes consumes 0.07 ounce of carbon in an hour. To give the carbons a longer life they are frequently electroplated with nickel or copper.

While it is true that some rods give a steadier current, the color of the light is not the pure white any longer and sometimes gives it a faint greenish tint. To steady the arc the carbons are sometimes cored, *i. e.*, the center of the carbon tube is filled with a carbon easily consumed by the current. It has also been observed that such cored carbons throw the light downwards. Of late the carbons have been mixed with various oxides to give a different color to the light obtained from the arc; thus Bremer mixes the carbons with some calcium oxides.

The following table in regards to carbon rods should be studied by the student:

Life of the carbon in hours	10	14	16	18
Lengths in inches...	7.9	10	11.5	12.8
Length of the arc in 25ths inch.....	1-2	2-3	4-5	
Current in amperes..	6-8	8-10	10-20	

Good carbons burn even, give little ash and should resist being scratched with a steel knife. They should give out a metallic sound when struck. Carbons from 0.443 to 0.59 inch diameter have a resistance of 0.18 to 0.14 ohms per foot. The coppered carbons have a resistance from 0.0009 to 0.009 ohms.

104. Werdermann Semi-Arc Lamp

Fig. 165 shows this lamp.

A carbon disc, A, is mounted on a brass base and held at D by the bracket, E.

The carbon disc is about 0.8 inch thick and measures 1.6 inches in diameter. A very thin carbon rod, B, from 0.04 to 0.12 inch thick, touches the carbon plate,

in a vertical direction, from below. There is a regulator mechanism, C, having a regulating spring which presses constantly against the carbon rod. The carbon rod itself is placed in a tube which in turn is held by the counterweight arrangement, P, and thus a constant pressure is exerted on the rod, B, pressing against the carbon disc, A. Such a lamp does not give the pure white light of the arc, and, besides, it consumes more current. It was used quite a little in the early days.

105. A Hand Regulator

For experiment of short duration the carbon can be regulated by hand.

FIG. 165

Fig. 166 shows this. A base about 8 inches long and wide, carries a standard of wood or metal about 12 inches high. Through the hole in the end of the cross arm a metal tube slides with but little friction. This metal tube at the lower end has a set screw which clamps the upper carbon. This makes a connection with the cross arm. On the top of the metal tube a turned piece of wood is forced and which serves as a handle. The lower carbon is fastened similarly with a piece of brass or metal tubing and attached as shown in our illustration.

Two binding posts are provided as shown to make connection. The carbons are now brought together so that they touch and a strong current which must at least have 40 volts pressure is passed through the carbons. Then the upper carbon is slowly withdrawn about ⅛ inch or more and the arc is struck.

FIG. 166

A steady arc requires at least 44 volts, which requires from 20 to 25 Bunsen or bichromate batteries. The greater the surface of the electrodes, or the higher the amperage, the more brilliant the arc will be. Below 40 volts the arc hisses and is not steady. By using extremely fine carbon about 1/16 inch thick an arc can be struck with about 20 volts and will give fairly good results for a short time. It is, however, not very steady.

As a rule the carbons are placed in line exactly above each other. Sometimes however, it is desired to throw the arc sideways, and in this case the arrangement as shown in Fig. 167 is resorted to. The positive carbon is in this case placed sideways and the crater thus formed acts as a reflector. Sometimes the positive carbon is placed below and then the light is thrown to the ceiling. This is sometimes used in indirect lighting.

106. D'Archereau Regulator

If the carbons are to remain the proper distance apart it is necessary that some means be found by which the carbons are kept in proper relation to each other, by some electrical or mechanical means. It is, of course, evident that in such a case regulation by hand will not do and this has given rise to complicated regulators such as are used in modern arc lamps. It would carry matters too far to describe all the different systems used and we will therefore show a few of the more important ideas.

FIG. 167

D'Archereau in 1848 was perhaps the first to make an automatic regulator, and this is shown in Fig. 168.

This regulator is satisfactory for short runs and gives quite good results but it could never be developed commercially.

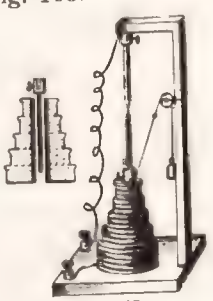


FIG. 168

Our illustration shows a base with a standard and cross arm and at the top the positive carbon is attached by a piece of brass tubing and set screw as shown. Around a cylindrical iron rod 6 inches long 0.4 inch in diameter, a sleeve for the other carbon is attached as shown in the small side illustration. Over a cardboard tube about 6 inches long and of such diameter that the iron rod moves freely in the tube we wind about 65 feet double cotton covered copper wire about No. 12 B. & S.

One end of the wire connects with

one binding post on the base, the other end is connected to the lower carbon through a copper spring pressing against it. The other binding post is connected to the upper carbon as shown.

From the lower carbon, as shown in the illustration, a thin cord runs over a pulley and the free end of the cord carries a small receptacle which is to be filled with small weights so that it lifts the carbon slowly when no current is passing through the coil. As soon as the current flows through the coil the magnetism pulls down the iron-rod into the spool and separates the carbons. In order that the arc be steady, the counterweights must be in proportion; the right weight being found by experiment.

FIG. 169

107. A Swinging Regulator

This is shown in Fig. 169.

A base and standard is built similar to that shown in Fig. 166. The standard and arrangement to hold the carbon has been described there.

The lower carbon is forced into a piece of metal tubing soldered on top of a swinging armature as shown. This armature, as will be seen, has a circular piece of iron and is held up by a piece of phosphar bronze strip which latter is attached to the vertical standard.

The armature is connected to a fairly strong electromagnet, as clearly shown in the illustration, and this electromagnet has a soft iron wire core 2 inches long and 0.4 inch in diameter. The electromagnet itself is wound with 18 feet of double cotton covered copper wire, No. 12 B. & S.

When the current flows through the electromagnet and the carbons, the iron core pulls the armature down and the carbons are separated. This, of course, weakens the current or interrupts it and the armature now moves up again and the lower carbon hits the upper one only to be carried down again the next moment.

This rapid lighting and extinguishing of the arc occurs so rapidly that the arc appears steady, as the carbons have not time to become cold during the rapid contacting.

The rapid movements of the lower carbon striking against the upper carbon prevents the latter from sliding down and coming to rest on the lower one.

This regulator works quite well but its light seems to flicker a little and the carbons are quickly consumed; another bad point is that incandescent carbon pieces are thrown about and if such a lamp was built on a larger scale, it would give off an annoying noise.

108. Jablochkoff & Wilde Candles

It seems to us there couldn't be anything simpler than the idea of placing the carbons parallel to each other as in such a case the regulating mechanism would be unnecessary. The idea is ridiculously simple and such an arc lamp can be made very easily.

Two carbon rods about 0.16 inch in thickness are laid upon a straight surface and the intervening space is filled up with plaster of Paris. The electric current jumps from one carbon to the other at the top and at the point where the current goes from one carbon to the other a white arc is formed. The plaster of Paris which is an insulator, melts in the heat of the little arc and goes up in vapor. The carbon rods, therefore, become free in a short time and are consumed slowly as the insulating mass is vaporized.

This process goes on slowly and quietly just like the burning of a wax candle.

FIG. 170

In order to light the Jablochkoff candle the two upper carbons when new are connected together by means of a thin graphite or carbon conductor. As soon as the current enters it fuses the graphite or carbon at the top and the arc between the carbons is struck.

The candle as shown in Fig. 170 is simply put in a holder very similar to a candle stick and is connected by means of two binding posts with a current supply. The small illustration below Fig. 170 shows the cross section.

An advantage of this lamp is that due to the vaporization of the plaster of Paris, quite a powerful light is obtained. It is necessary, however, for steady

burning to use alternating current. In such a case the two carbons are of the same cross section. If direct current is used it is necessary that the positive carbon be double the cross section of the negative carbon. However, in this case the burning of the candle is not as steady as with alternating current.

The Jablochkoff carbons usually have a length of 8 inches and a diameter of 0.16 inch and last about one-half hour.

Of course, the great disadvantage of the Jablochkoff candle is that once the current is turned off the candle cannot light again of its own accord and it is necessary to strike the arc by hand, for instance, by putting a short piece of wire across the carbons to make the connection, and that is the main reason why

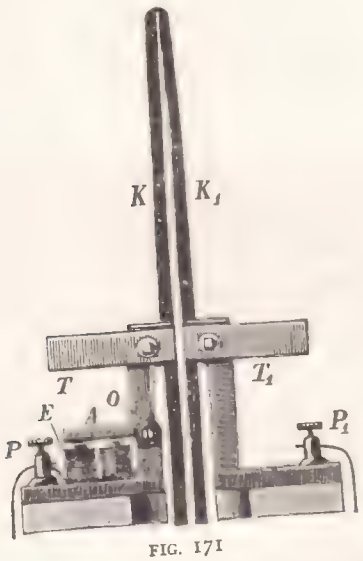


FIG. 171

this lamp has never found extensive use. It was used, when it was first invented in Paris, for some time, but it had to give way shortly to the automatic modern arc lamp.

Wilde's idea was to do away with the above shortcomings and he constructed the lamp as shown in Fig. 171.

The carbon, K_1, is attached rigidly to the upright, T_1. The other carbon, K, is attached to the cross arm, T, which carries an armature, A, the entire metal piece being turnable on its axis, O. A spring keeps the armature, A, from touching the electromagnet cores, E, in such a manner that the upper extremities of the carbons touch each other as shown. As soon as the circuit is closed the current passes through the two carbons, and the electromagnet, E, pulls the carbon, K, away from, K_1, resulting in an arc.

Thus, this candle will light itself any time after the current has been turned off. The arc is not steady but varies a great deal and for this reason this model is not used as widely as the idea deserves.

(To be continued)

WIRELESS EQUIPMENT OF U. S. S. UTAH

By H. Winfield Secor

The U. S. Battleship *Utah*, one of the squadron recently assembled for the naval review at New York City, has an interesting wireless installation.

The set, in general, is of a modified Fessenden type. The transmitter is of 5 kw. capacity, with a standard sending range of 200 miles under all conditions, and sometimes up to 600 miles or more, under good conditions, and comprises a motor-generator set of the General Electric type. Its D. C. motor takes its current from the ship's dynamo room, and the A. C. generator produces a 500 cycle current of variable voltage. The A. C. from the motor-generator is passed through a standard key, and is thence stepped up in potential by a Fessenden vertical type, air cooled, high potential transformer. The secondary winding of this transformer is shunted by a safety spark gap with ball electrodes, to prevent unduly straining the windings, by causing the current to leap too long a gap.

A new form of quenched spark gap, designed by Fessenden, is employed, and instead of utilizing round plates, they are square, thus giving greater heat-radiating surface, for a given size of plate.

The sending condenser is a set of one dozen, Wireless Specialty Co.'s type, glass Leyden jars, with copper coatings burned onto the glass, to prevent blistering.

The transmitting inductances are two in number, one being an oscillation transformer, of the air core type, and wound with round copper wire. The other in-

(Continued on page 917.)

The New Naval Wireless Station at Washington

AN event of considerable interest to those identified with wireless telegraphy will be the opening of the new naval wireless station at Washington. This station, which has been in the course of construction for nearly a year, is now well advanced toward completion and will be put into service in the near future. It was designed for the purpose of enabling the naval authorities at Washington to keep within constant range of communication of any war vessel within a radius of three thousand miles. Since beginning construction of the present station, however, the enthusiasm of the government has been aroused, and it is now proposed to erect a chain of similar high-power stations in every part of the American possessions so that the range of communication may be extended to include the entire globe.

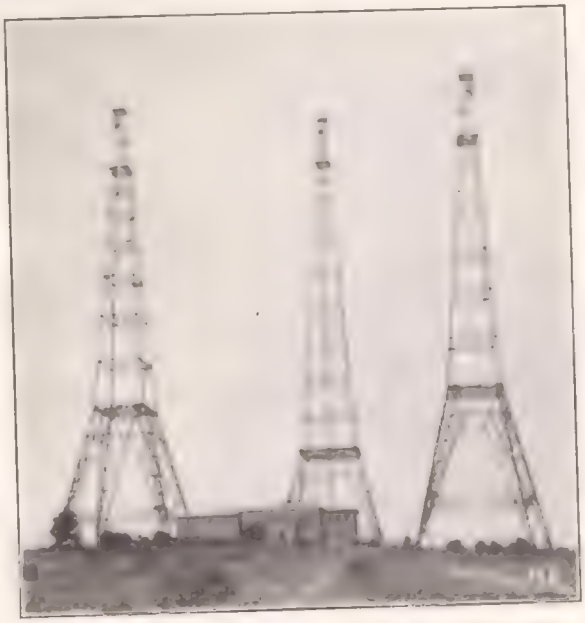


FIG. 1.—TALLEST WIRELESS TOWERS IN THE WORLD.

The station is situated on the heights of Arlington, just across the Potomac from Washington, and but two miles from the building occupied by the Navy Department. The three great steel towers for supporting the antenna are the highest structures ever erected for this purpose. Two are four hundred and fifty feet high, while the third is six hundred feet. They are so arranged that lines joining their bases form an equilateral triangle. They are built of lattice-work steel beams, each resting upon four feet securely anchored to massive concrete foundations. Each tower is electrically insulated from the ground by slabs of marble eight inches thick placed between each of the feet and the foundations proper. Four heavy bolts pass through each sheet of marble and are fastened to the foundation plates, the nuts being separated from the latter by large porcelain washers as shown in Fig. 2. In this manner absorption of radiated or received waves by the towers themselves is prevented. A grounding switch is placed on each foot for protection from lightning.

The building for the station is situated midway between the two lower towers. It is a two-story and basement brick and concrete structure, fireproof throughout. On the first floor are located the office of the commandant, the telephone and telegraph rooms, the sound-proof receiving room, the large transmitting room containing the machinery and apparatus for sending, and the experimental laboratories. The second floor contains the quarters of the operators and the officer in charge of the station, while in the basement are located the power and sending transformers and the machine shop.

The wireless equipment, which is of the Fessenden type, was designed and built by the National Electric Signaling Company. The transmitting set consists of a motor driven 220-volt, 500 cycle, 100 kw. alternator supplying a high tension transformer. The prim-

ary oscillation circuit includes condensers of the tubular compressed air type, a synchronous spark-gap driven from an extension of the alternator shaft, and the primary of an oscillation transformer. The antenna circuit contains the secondary inductance. This set is being installed under a guarantee of successful transmission during daylight to a distance of three thousand miles. The receiving apparatus is of the well-known Fessenden type.

Current for the operation of the transmitting apparatus is furnished by the city central station over a 6,600-volt, 3-phase, 25-cycle line. In order to guard against possible interruption of the power supply, current may also

FIG. 2.—SHOWING INSULATION BETWEEN FOOT OF TOWER AND FOUNDATION

be obtained from a nearby railway power station or from the military post of Fort Meyer about half a mile away. As a further precautionary measure a gas engine capable of driving the transmitting alternator is being installed. Transformers are provided for reducihg the line voltage to values suitable for the operation of motors and lamps.

Preliminary experiments with the apparatus are now in progress, a temporary flat-top antenna having been raised between the two lower towers. The outcome of these experiments is anxiously awaited, and some startling results will no doubt be obtained. The installation of the apparatus is now nearly complete, and the station will be ready for service about December 1st.

GETTING BACK TO FIRST PRINCIPLES

We quote herewith an editorial from our British contemporary, *Electricity*, which appears under the heading

"Rough on the Frog."

"According to the *Daily Mirror*, wireless messages can now be recorded on paper, thus obviating the necessity for constant listening on the part of the operators, and ensuring a record of every message coming within range of the receiving apparatus. At first sight this naturally strikes one as an epoch-marking advance in wireless telegraphy, since it bids fair to overcome one of the principal drawbacks to this system of signaling without wires.

"But what of the means by which success has been achieved? According to the above authority, M. Lefeuvre, Professor of Physiology at the Faculté de Médicine, of Rennes, is responsible for the invention, and wireless messages have been recorded by his system over a distance of 200 miles. The signals are recorded by causing the received current impulses to pass through the nerve of a frog's muscle, to which a delicate lever is attached.

"In response to the stimulating action of the current, convulsive movements are made by the muscle, causing the attached lever to trace corresponding long or short curves on smoked paper, thus reproducing the Morse code. Here we have history repeating itself with a vengeance for this adaptation is a direct throwback to Galvani's original and historical experiment with the frog's leg. Incidentally, it would appear to offer features for consideration by the S. P. C. A., who, I understand, have already studied cruelty as applied to the slippery and elusive eel, a species closely approximating to that of the frog.

"Should this discovery be put to practical use we may expect an unprecedented demand to arise for young and vigorous frogs. Tadpoles will be at a premium; the small boy will reap a rich harvest with his net and pickle-jar; and copies of the "Ode to an Expiring Frog"

(*Continued on page 940.*)

The Scientific Adventures of Mr. Fosdick

By Jacque Morgan

"The International Electro-Galvanic Undertaking Corporation"

THE first two envelopes contained only circulars. But from the third dropped a bright yellow slip of paper, and as Eben Stetzle, loafing in the tinshop during the noon hour, picked it up from the floor and handed it to Mr. Fosdick, he saw that it was a check signed by the Ajax Manufacturing Company and that it called for four hundred and twenty dollars in real money.

"Last month's royalties on my curling-iron," carelessly explained the inventor.

He always spoke of the device as a curling-iron, although it was advertised and sold by the manufacturing company as a nut-cracker.

Mr. Stetzle sighed. "Gee, I wish I could get in on something like that. Running a chopmill is a mighty slow way to get rich."

The sight of the check removed the last trace of bitterness that had lingered in Eben's heart since his unhappy experience with The Feline Light and Power Company.

"I should like to get in on the next good thing you get up," he continued, eyeing the check that protruded from Mr. Fosdick's waistcoat pocket. "But, of course, I'm not going in on any more electrified cats. The very sight of a cat makes me shudder even now."

Mr. Fosdick gazed at his friend pensively. "I have been thinking," he said, of the organization of a company that will make 'Standard Oil' look like a penny savings bank."

Eben Stetzle drew in his breath with audible inquisitiveness. "What is it? What is it?" he demanded.

Mr. Fosdick smiled blandly. "Yes, what is it?" he mimicked, genially. "You don't think I'm going to divulge a secret that's worth millions, do you?"

Eben's face fell. "I thought you'd let an old friend in—a brother lodge member," he said wistfully. And at the same time Eben formed his hands into the distress signal of the order.

Mr. Fosdick pondered. His lodge was to him a thing sacred. Every Wednesday night in the hall over Lem Whitley's grocery store, Mr. Fosdick sat in state; he was the presiding officer, and the thunder of his voice as he read the ritual to the trembling neophytes was a thing that was very dear to him. And Eben had given him the grand hailing sign!

"Brother Stetzle," he said at last, "I'm going to tell you—and what's more I'm going to let you in."

Mr. Stetzle leaned forward and with great enthusiasm gave Mr. Fosdick the grip. "Brother!" he exclaimed.

Picking up his text-book, "Electricity at a Glance," Mr. Fosdick turned the pages until he came to the following paragraph:

"Flowers and even insects can be preserved indefinitely by powdering them with graphite and then depositing a thin film of copper over them by means of a plating battery."

"Does *that* mean anything to you?" His voice was tense with feeling.

Mr. Stetzle read the paragraph and slowly shook his head.

"Who would want to preserve insects indefinitely? I just hate the sight of 'em," and Eben scratched his back as though the very suggestion brought back unpleasant memories.

Mr. Fosdick smiled tolerantly. "You are deficient in imagination, Eben." He leaned forward and whispered: "What would you say to a scheme of using the principle for *undertaking purposes?*"

Mr. Stetzle failed to grasp the significance of the question.

"I don't know of any insect undertakers—

"DOES THAT MEAN ANYTHING TO YOU?"

of course there's fellows in the big cities that make a business of killing——"

"But I mean for men—for human beings!"

Eben shook his head hopelessly. "I just can't quite get you."

Mr. Fosdick sank back in his chair with almost a feeling of disgust. He surveyed his unimaginative lodge brother for a long minute and then straightening up, outlined his scheme in words of one syllable.

"It's like this, Eben," he began. "If insects

can be copper-plated, human beings can be copper-plated. And if a human being can be plated he, or she, can be preserved indefinitely—and with absolute fidelity as to face and form. You take the old Egyptian mummies—what are they to-day? Why, just crumbling

"WAKE UP, EBEN."

shells that don't look like anything. But suppose those bodies had been electroplated? Why, they would simply be statues of their original selves."

Mr. Stetzle nodded. "I begin to understand now," he said.

"Listen. We'd simply make every corpse its own monument. Mount the monument on a cheap concrete base and stand it up in the cemetery. No excavating, no coffin, no box—nothing but the monument itself. Think of the saving! The cadavers can be plated at an expense of three dollars apiece—we can get fifty, or even a hundred. *And there are annually over one and a half million deaths a year in this country alone.* Suppose, say, we only made a profit of ten dollars apiece. The total is fifteen million for the United States, *annually*. Add to that the profits on the undertaking of seven million funerals throughout the balance of the civilized world. Can you grasp it? Why, Eben, a hundred thousand a day would be nothing!"

Mr. Stetzle sat as one in a trance. "It's overpowering," he gasped.

Mr. Fosdick smiled. "Why, I haven't begun yet. As a matter of fact the profit per job of The International Electro-Galvanic Undertaking Corporation—that will be the name of the concern—will be more like fifty dollars than ten. *And even more.* Listen. Only the cheaper grades of corpses will be finished in copper. The majority will be nickel-plated; silver will be used for those of moderate means; and gold for the aristocrats."

The proprietor of the chop mill was speechless.

"And just think what a handsome place the new cemeteries will be of a sunny morning. Copper, nickel, silver and gold statues all sprinkled about. Cheerful is no word for it! Why, man, they'd become amusement parks!"

Mr. Fosdick softly drummed his fingers upon the arm of his chair while he allowed the idea to sink in.

"I've thought of a splendid new feature to the scheme, suddenly said Mr. Stetzle. "How would it do to have mounted in the statue somewhere a phonograph with a cylinder of 'last words,' or a song, or a recitation—you remember how Clem Titus that's dead and gone now, used to recite every time he got drunk, 'Goodbye, Jim. Take keer of yourself.' Well, that's the idea. By pulling a string the phonograph reels out anything that was characteristic of the deceased. Old man Fisher used to cuss the administration——"

"I think that would be undignified," interrupted Mr. Fosdick, coldly. "Think of a cemetery with a thousand of your confounded phonographs working at full blast—songs, recitations, speeches, and so on! Why, it would be noisier than Coney Island!"

The enthusiasm of the new idea slowly faded from Mr. Stetzle's face and he subsided.

"Well," said he, after a silence of some minutes, "when do we try it?"

"As soon as we can get a corpse."

"Must we wait? There hasn't been a death in Whiffleville in five years."

Mr. Fosdick had not thought of that. For a moment his dream was shattered, and then with the resourcefulness of the true inventor he thought of a way to overcome the difficulty.

"No," said he, "we will not wait. We will try the scheme upon a living person—*you*."

Mr. Stetzle paled. "I'd rather not," he protested weakly. "I'm too fat and wouldn't look good."

"The first statue will be you," declared Mr. Fosdick sternly. "Why, man, it will be an honor!"

"But I don't want my ears and eyes and nose stopped up with no dodgasted copper plating," protested Eben.

Once more Mr. Fosdick's resourceful brain came to the rescue: "You will only be plated from the neck down."

There was no escape. Mr. Fosdick was adamant, and it was with great reluctance that Mr. Stetzle finally agreed to submit to the experiment.

"To-morrow," said Mr. Fosdick, "the embalming vat—the plating bath, I should say—will be ready for you."

* * * * *

The wooden trough, borrowed for the occasion from Jasper Wilcox's hog-lot, contained a solution of copper sulphate. The

telegraph company, through the agency of Hi Scruggs, the local operator, had loaned the batteries; and Moses Goldblat had contributed the slab of copper junk to be used for the anode—in consideration of the sum of four dollars and eighteen cents.

Everything was ready and at the quiet word of command of the chief engineer of The International Electro-Galvanic Undertaking Corporation, Mr. Stetzle quickly divested himself of his clothing and assisted Mr. Fosdick, who briskly began to powder the rotund form with graphite.

"Makes me look like a nigger—I—I suppose it will come off all right," remarked Mr. Stetzle dubiously.

"Certainly. It's just a matter of a little soap and water," said the inventor, smiling as he caught a distorted reflection of himself upon the highly polished surface of Mr. Stetzle's stomach. "Sure. No doubt about it."

It was the work of but few minutes for Mr. Fosdick to pose Mr. Stetzle in the plating bath.

"You will represent the Winged Mercury, one of the finest examples of ancient Greek art," said Mr. Fosdick, arranging the legs and arms as he had seen them in the illustration in the back of a dictionary. "I can make some little wings and solder them to your ankles afterwards."

Mr. Stetzle, thoroughly resigned to submit to anything, made no comment.

"And now," said Mr. Fosdick, "I'll just lock you up in the shop for an hour while I go out and fix the widow Johnson's doorbell, and put in a window at Sam Horton's, and get Lem Hunter's umbrella what's busted, and needs mending, and do a few other little odds and ends."

* * * *

It was late in the afternoon when Mr. Fosdick returned to the shop. His errands had taken him much longer than he had supposed.

In the trough lay Mr. Stetzle, snoring. The afternoon had been hot and the cooling influence of the plating bath had been more than he could resist. Flies had bothered him at first, and in his endeavors to brush them off he had saturated his face and hair with the copper solution and Mr. Fosdick was somewhat startled to see that it had turned them a dark green.

"Wake up, Eben!" Mr. Fosdick punched the recumbent form with a broom handle. It was like punching a stone; Mr. Stetzle's ribs were incased in a quarter-inch armor of solid copper.

A tweak of the green nose brought better results, and Mr Stetzle opened his eyes and endeavored to stir. There was not the slightest movement.

It was the work of an hour, perhaps, and Mr. Stetzle had begun to become petulant. But in the end, with the aid of a block and tackle, Mr. Fosdick had succeeded in lifting him out of the trough and had balanced him on one foot—a Winged Mercury of bright, shining copper.

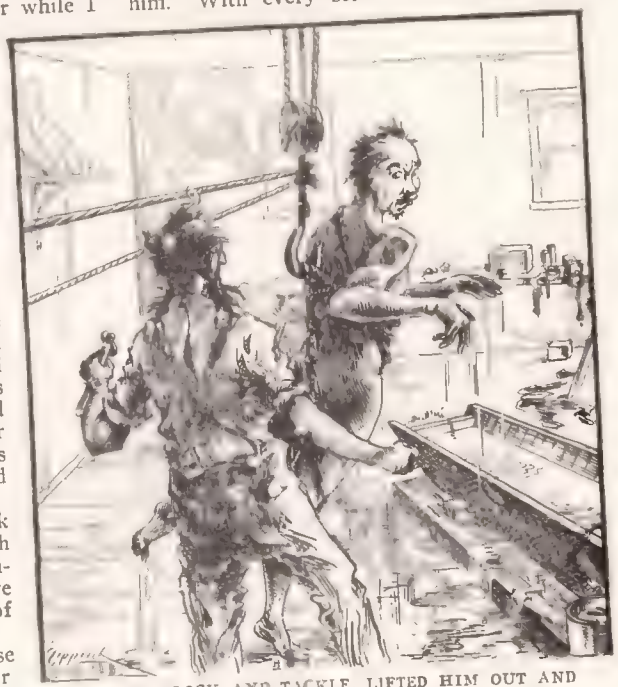
"Splendid!" he ejaculated, and he gazed at his handiwork admiringly. "I'll get some of the boys down here to-morrow with old Judge Henley and we'll get up the corporation papers in no time."

"*To-morrow!*" yelled Mr. Stetzle with a sudden and fierce indignation. "Do you think I'm going to stand here on one foot all night like a dodgasted cigar store Indian? Not on your life! I've got complimentary tickets for 'Uncle Tom's Cabin' for this evening and I've got to take Mrs. Stetzle and the children. Now you get me out of this dodgasted boiler plate union suit right now!"

Mr. Fosdick scratched his chin reflectively. "All right, Eben," he soothed. "I'll split you up the back and you can crawl out like a locust. The shell will demonstrate the success of the idea." He picked up a pair of calipers and applied it to various portions of Mr. Stetzle's anatomy. "I should say that the metallic envelope is from a quarter to a half inch thick," he remarked pensively.

"You quit that figurin' and get me out," raged Mr. Stetzle. "I ought to have had more sense after fooling with your dodgasted electrified cats and spending ten days up on a foot square insulated galvanometer pier endurin' the grins of all them dodgasted students."

With great labor Mr. Fosdick managed to lower Mr. Stetzle to the floor. And then with a cold chisel and hammer he began the work of divesting him of the metal that incrusted him. With every blow of the hammer Mr. Stetzle let forth a groan.



WITH BLOCK AND TACKLE, LIFTED HIM OUT AND BALANCED HIM ON ONE FOOT

"That chisel is going right into my backbone!"

Mr. Fosdick considerately laid aside the chisel and took up a hacksaw. It was slow

work. Supper time came, it grew dark, and notwithstanding the lamentations and curses of Mr. Stetzle, the now somewhat alarmed Mr. Fosdick had only cut a groove of about six inches along Mr. Stetzle's spine.

At midnight Mr. Stetzle's rage knew no bounds.

"Dodgast you!" he bellowed. "I've missed my supper, I've missed the opry, and I'm missing my sleep!"

"Why, Eben, I'll get you a pillow and you can sleep while I work."

"*Sleep!*" ejaculated Mr. Stetzle hotly. "How in thunder can I sleep with you a hammerin' my vitals and a punchin' into my backbone with a dodgasted cold chisel?"

At dawn the thoroughly exhausted Mr. Fosdick began to despair. "I'm afraid, Eben," he said gravely, "that I'll have to crate you up and ship you down to the city where they have steam hammers and hydraulic jacks and things — unless — unless" — why hadn't he thought of it before—"unless I can take the metal off the same way I put it on."

"Do anything," snarled Mr. Stetzle. "Put me under a steam hammer, rip me open with a hydraulic jack, grind me apart on an emery wheel, blow me open with dynamite, melt me apart with an acetylene blowpipe—do any of the dodgasted things you been talking about!"

Mr. Fosdick made no reply. With the aid of the block and tackle he lifted the protesting Mr. Stetzle back into the trough.

"Sufferin' snakes, but this water is cold!" gasped Mr. Stetzle, his teeth chattering.

The battery was now reversed. The copper shell was made the anode and the small remaining slab served as the cathode. And then Mr. Fosdick calmly locked up the shop and departed for home for a much needed rest.

It was noon before Mr. Fosdick awoke. Quickly making a bundle of soap and towels he hastened back to the tinshop where he arrived just in time to see the martyr to science slowly crawl out of the plating bath, the now fragile copper shell falling from his body in flaky showers.

"Splendid!" exclaimed Mr. Fosdick. "See what science will do?"

Mr. Stetzle turned on him with a glare of unutterable hatred.

Seeing a film of copper hanging down between the shoulder blades, Mr. Fosdick grasped it and gave a sharp pull.

"*Yow!*" Mr. Stetzle leaped a couple of feet into the air and wheeled about in a rage of fury. "The dodgasted stuff sticks like a porous plaster!" he shouted. "I've been all night a pullin' of it off."

At last, after the expenditure of much patience on the part of Mr. Fosdick and of a great deal of profanity on the part of Mr. Stetzle, the coating was removed—all except that around the toes which gave much trouble.

The most vigorous application of soap and water, however, failed utterly to make the slightest impression upon the glistening black skin.

At this unexpected phenomenon Mr. Fosdick was both astonished and interested.

"Cataphoresis!" he exclaimed after a moment's study. "The current, Eben, has driven the black pigment, graphite, into the skin. You may never be white again," he added cheerfully. "And that gives me another idea."

"*Another idea!*" bellowed Mr. Stetzle. "Well, if you ever hook me again into another one of your dodgasted ideas—if you ever interest me again in any electrified cats or idiotic copper-plated undertakin' schemes—why, then they can lock me up in the foolish-house. Good *b-y-e!*" and grabbing his coat and hat Mr. Stetzle rushed out of the tinshop, leaving a trailing wisp of profanity in his wake.

Mr. Fosdick watched the retreating form meditatively. "I wonder what made Eben so angry?" he muttered.

"YOU MAY NEVER BE WHITE AGAIN," HE ADDED, "AND THAT GIVES ME ANOTHER IDEA"

PRELIMINARY TEST ON NEW WIRELESS STATION

It is reported that the first test of the sending apparatus of the new Navy wireless station, at Arlington, Va., were made on the night of October 28th. Attempts were made to call the stations at Key West, Fla., and Colon, Panama, but no replies were received to indicate that the signals were heard.

ARLINGTON STATION PICKS UP MESSAGE FROM CLIFDEN, IRELAND

It is reported that during the evening of October 29th, the operators at the new Arlington station picked up and copied messages being sent from the Marconi station at Clifden, Ireland. The distance is approximately 2,500 miles.

Along The Great White Way

Photo by O. J. Gude Co., New York

The Kleanwell Tooth Brush sign, erected by the O. J. Gude Co., for the Alfred Smith Co., if it were standing on the ground, would occupy the space of three five-story houses. The sign itself is 63 feet high, 81 feet long, and contains 3,500 electric lights. The letters, in "Kleanwell" are 34 feet high, each of the two toothbrushes is 66 feet long and the bristles 7 feet long; the figure of the imp is 51 feet high, his mouth 8 feet wide, and his eyes 4½ feet wide.

In action, the sign shows first the imp wriggling his legs and rolling his eyes, and yanking on the bristles of the two toothbrushes, as shown in the left-hand photograph, but he can't get them out. The imp and the toothbrushes then disappear, and the wording, as shown in the right-hand photograph is flashed on, after which the cycle of operations is repeated indefinitely.

This sign is located on top of a building at Fifty-second street and Broadway, and can be seen all the way down to Forty-second street. It is unique in that it is the first electric sign ever used to advertise toothbrushes.

CONDUITS AS SUBWAYS

The rat, with its proverbial wisdom, is evidently quick to take advantage of modern innovations.

A number of house wreckers at work in Worcester, Mass., over one hundred miles from the coast, were attacked by a swarm of large wharf rats. After the rodents had been driven off with shovels and crowbars, it was discovered that they had emerged from a telephone conduit, over which the structure being destroyed had been built.

Officials of the local telephone company claim that the conduits from Boston form a rat subway throughout New England.—*Stuart R. Ward.*

MARCONI'S EYE REMOVED

It is reported from Rome that surgeons have found it necessary to remove the right eye of Mr. Marconi, as a result of the automobile accident in which he was injured. We trust that the sight of the other eye will not be seriously affected.

WIRELESS FROM AIRSHIP

It is reported from Berlin that during a cruise of the new German naval airship which lasted thirty hours, wireless communication was established with the station at Norddeich, as well as several other German wireless stations.

Static Electric Motor

By H. B. Dailey

ALTHOUGH among the earliest of the manifestations of electrical action to engage the attention of the old-time physicists, the phenomena of static electric attraction and repulsion still furnish for the amateur experimenter a field full of fascinating possibilities for entertainment. For exhibiting at work in a novel way these subtle and curious natural forces, the true nature of whose action is still a problem unsolved by modern science, there is perhaps no type of experimental apparatus more interesting and instructive than the static electric motor. While small electric motors to run with current electricity are now so common as to have almost ceased to attract attention, the extreme rarity of the static motor, and its entirely different principle of action, operating as it does by direct electrical impulse without the employment of magnetism, gives to it a peculiar and unusual interest. The two examples of static motors here illustrated furnish most entertaining demonstrations of the dynamic action of static electricity and constitute novel adjuncts to any collection of experimental apparatus.

Fig. 1 is an oscillating type imitating

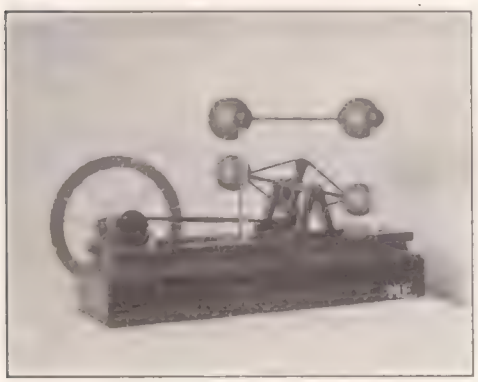


FIG. 1

in appearance a horizontal beam engine An oscillating lever of vulcanite built in the shape of a walking-beam carries at its extremities a pair of 1½-inch wooden balls, which are given a conducting surface of tinfoil cemented on, in small sections with shellac varnish. Above the walking-beam lever, insulated upon glass posts, is a pair of electrically connected foil covered wooden balls 2 inches in diameter. In the base of the instrument exactly below the oscillating lever is a second pair of electrically joined foil-covered balls similar in size to those above the lever. These balls, which are not insulated, are in electrical communication with a binding post on the bed-piece of the motor. The height of the upper and lower pairs of balls is so adjusted as to just clear the oscillating balls at the extreme limits of their movement. The movement of the lever is communicated through a light wooden connecting rod to a crank disk and fly-wheel, also of light-weight wood. In operating, the upper pair of balls is connected with one of the poles of a Wimhurst or Holtz machine, the lower pair being in communication with the opposite pole of the machine through the binding post.

Static electric attraction and repulsion cause a lively oscillation of the walking-beam, the result being a movement of the engine oftentimes so rapid as to be almost invisible.

The principle of action is briefly as follows: The upper balls being highly electrified, exert an attractive force upon the nearest of the movable balls, causing it to rise, until coming within sparking distance it receives a charge. Being now of the same electrical sign, attraction is changed to repulsion, the moving ball being now forced downward, until arriving at its lowest point it parts with its electricity to the lower ball and is again attracted upward. The ball at the opposite end of the lever being insulated from, and therefore independent of, its mate, executes similar movements, but, of course, alternately timed. Since the mechanical forces of static electricity are far from powerful the apparatus to be operated from them, must be delicately and lightly designed. To this end the moving balls are made hollow by being first split in two, the interior gouged

out until the walls are about ⅛ inch thick, and then the halves glued together again, or thin celluloid ping-pong balls may be used. The lever oscillates on pivot bearings, while the shaft journals of the flywheel are of very small diame-

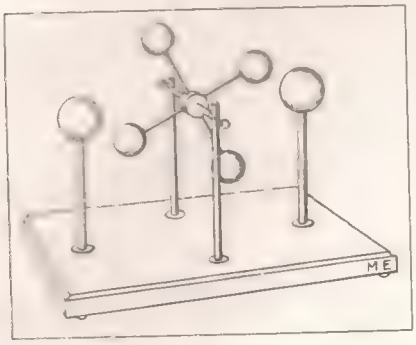


FIG. 2

ter, the shaft being made of a piece of slender knitting needle running in brass bearings. This elegant little machine is a fascinating thing to watch in action, the rapid, regular click of the small sparks as the swiftly moving balls charge and discharge themselves, being strongly suggestive of the pulsation of a steam engine.

Fig. 2 is a rotary type of motor that can be easily made by the amateur. In this instrument a short horizontal shaft provided with pivot end bearings has radiating from its central hub four arms of round vulcanite rod or tubing, each carrying a 1¼-inch foil covered solid wooden ball. At opposite sides of the horizontal diameter of the revolving member thus formed are mounted on glass or vulcanite posts, as close as possible to the moving balls, two foil-covered wooden balls 2 inches in diameter. On connecting the two stationary balls to opposite poles of a static machine the spindle revolves at a rapid rate. This motor has about it sensitiveness and life that is wonderfully taking.

WIRELESS ON U. S. S. UTAH

(*Continued from page* 908.)

ductance is an aerial loading coil, and consists of a drum about 1 foot in diameter by 16 inches high, wound with No. 10 copper wire, with turns spaced about ⅜ inch apart.

The wave lengths now in use are 625, 750, 825, and 1,000 meters; and hence if the ether is very busy at say 625 meters wave length, the operator simply changes his loading inductance and oscillation transformer value to another tune. The loading inductance and also the oscillation transformer have calibrated scales on them, enabling the proper inductance to be placed in circuit quickly for any given wave length in meters.

An aerial switch of special construction is employed. The aerial lead-in insulator is of electrose, about 2 feet in length by 6 inches in diameter at the center, tapering towards the ends, with a series of deep ribs along its length.

The receiving set is a standard Fessenden Navy Type, and is all contained in a hard rubber and black enameled wood cabinet, about one foot square and 16 inches high. On the face of this cabinet a switchboard is arranged, with means for adjusting two loose couplers, a potentiometer, variable condensers, battery, and two electrolytic detectors. These detectors have magazines holding several yards of Wollaston wire, which may be fed out, a little at a time, by turning a thumb screw which makes unnecessary the handling of short pieces of this fine wire.

At present, the Pickard Pyron and Perikon detectors are employed to a great extent, and the telephone receivers are of the adjustable magnet type, built by the Wireless Specialty Co. The regular 2000 ohm. type is used.

The aerial construction is quite elaborate. It is of the double inclined "T" type, and very good work has been done with it.

The aerial extends fore and aft of the two skeleton steel masts supporting the flat top section, and comes down, nearly to the deck, at each end. The wire is stranded phosphor bronze, with strain insulators about 1 foot long. The strands are spaced 4 feet apart. Mid-way between the two masts, the aerial strands have lead-in wires brought down for a distance of several yards, and they are then combined and joined to a heavy copper cable, with rubber covering, which leads down to the operating room.

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H. GERNSBACK, Editor

C. A. LeQUESNE, Jr., Assistant Editor

O. J. RIDENOUR, Business Manager

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Vol. V. DECEMBER No. 9

EDITORIAL

WE take pleasure in announcing the starting of a new section entitled "The Scientfic Apparatus Exchange" which will make its first appearance next month.

There has been a long felt want among experimenters and amateurs for a means whereby they could exchange apparatus, instruments and technical articles for which they have no further use, for other articles or apparatus which they need, and it is for this reason that *Modern Electrics* has decided to devote a number of pages monthly to such exchanges.

There will positively be no charge for this service. This is an entirely new idea and has been originated to benefit the American amateurs and experimenters who are readers of *Modern Electrics.* No articles intended for sale can be accepted, only technical, scientific and experimental articles and apparatus can be offered for exchange, such as wireless instruments, electrical apparatus, tools, photographic articles, text books, telescopes, etc., etc. It is also required that all articles for exchange must in all cases be offered for other similar technical articles of equal value and the advertisement must state in each case what other technical article or articles are wanted.

We outline an example as follows:

> "A homemade ¼ K.W. closed core transformer in excellent condition, size 15"x15"x6", giving ½" spark on a 110 volts; 60 cycle, A. C. Complete in well finished oak case, in exchange for a rotary spark gap with motor to operate on 110 V. D. C. or A. C. Henry Miller, Box 1560, Bordentown, Ill."

Under this heading we cannot accept advertisements containing more than fifty words; we also reserve the right to rewrite or refuse any advertisement which for any reason does not conform to this rule, or which will not be for the best interests of all our readers. We rely, of course, upon the honor of those using these columns not to send in fraudulent advertisements nor to enter into fraudulent transactions with others, and we will prosecute to the fullest extent of the law any individual fraudulently obtaining goods or material through the medium of an advertisement in these columns or obtaining articles on false representation of the article they offer in exchange.

Advertisers under sixteen years of age should send in their advertisements accompanied by a letter from a member of their family giving their consent to the transaction.

Advertisements for this section will only be accepted from private individuals. The use of our regular advertising columns is open to business firms or others desiring to advertise on a commercial basis.

Now, it is quite likely that you have some article which you have used as long as you have cared to, or which you do not now need in your experimental work; and if there is some other article of about the same value that you want, we would suggest that you send us, by return mail, an advertisement plainly written on one side of the sheet only, with your full name, street address and city, and it will be inserted free in this column.

Advertisements for this Department should be addressed to "The Scientific Apparatus Exchange," c/o *Modern Electrics.*

Advertisements can be published only one time free of charge.

This Month's Cover

HUMPHRY DAVY was born December 17th, 1778, and was a son of a xylographer. He was born at Penzance in Cornwall, England. He attended the primary schools in that city, but did not distinguish himself there and in the year 1795 he took a position with the apothecary of Penzance. In his early years, Davy was a great lover of poetry, but now, surrounded by drugs and druggists' apparatus and chemicals, he made extended studies to increase his knowledge and he took up languages with great energy.

SIR HUMPHRY DAVY

In the year 1798 Dr. Beddoe of Bristol erected a pneumatic cure institution in which he used nitrous oxide as his main remedy for his patients. In this institution Davy was introduced in the capacity of an assistant to help Beddoe in his work. Davy soon learned to experiment with the nitrous oxide and found a novel means to produce it. Thus he wrote, although only 20 years old, several good chapters for a book published by Dr. Beddoe, upon which he was commended quite a little. Shortly afterwards he was recommended by Count Rumford to the newly formed royal institute of London He obtained the position as Professor of Chemistry and he soon rose rapidly through this position. Later on, he delivered several lectures in connection with chemistry and its application for horticulture. He first became member, then secretary, and finally, in the year 1820, president of the Royal Society. In the year 1812 he was knighted and married a distinguished lady and undertook frequent trips to the continent. In 1827, due to his sickness, it became necessary to give up his position and he therefore visited the continent again to regain his health. He finally died in Geneva, May 30th, 1829.

Among Davy's most important discoveries are the potash metals, the proof that chlorine is a simple body, the arc light, the decomposition of water by means of electrical current, etc. While it is true that Sylvanus P. Thompson, in the year 1802, had a zinc silver battery of 120 elements from which he received an extraordinary strong spark as soon as the two poles were touched, the real electrical arc between carbons is due to Davy. Davy first used ordinary charcoal rods and when he demonstrated in 1810 his arc before the royal institute, he used a battery of 2,000 elements, contained in 200 porcelain troughs. It will be noted that nobody before Davy used a real arc, that is, obtained the powerful light between two carbon electrodes *after* these electrodes had been separated and were not in actual contact any longer.

The Wireless Amateur and the Wireless Law

By C. A. LeQuesne, Jr.

Part One

THERE has been of late a persistent and heavy demand on the part of the wireless amateur to know just where he stands with relation to the new wireless law, and to know whether his station conforms with the provisions of the law. This demand has prompted the preparation of the following article.

The law itself was published in full in the November issue of this magazine.

Briefly, the law, as far as the amateur is concerned, is as follows:

He may not use transmitting apparatus powerful enough to send his signals across the boundaries of the state in which he is located, with sufficient energy to be detected by a sensitive receiving set just beyond the state boundary, or powerful enough to interfere with the receipt, by others, of signals from beyond the state boundaries, *unless he has a license.* If he has a license he may so transmit messages or signals, but he must not, unless he receives a special license, use a wave-length of more than 200 metres, or a power input to his transmitting apparatus of more than one kilowatt; or, if he is within five nautical miles of an army station or a navy station equipped with radio apparatus, his wave length must not be more than 200 metres nor his power input more than one-half kilowatt. The penalty for operating a station without a license after December 13th, next, is a fine of not more than $500 and the forfeiture of the apparatus.

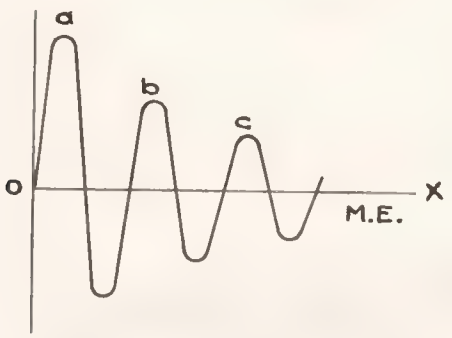


FIG. I

He may receive messages from anywhere, on any wave length, without a license, provided his station is not equipped for sending. If he is equipped for sending he must have both a station license and an operator's license, and he must not permit an unlicensed person to use his sending apparatus except under his direct supervision. The penalty for failure to observe the latter provision is a fine of not more than $100, or imprisonment for not more than 2 months, or both, as provided in Section 3 of the law, and for repeated violations, the forfeiture of the licenses.

The sending wave must be pure, that is, the person who has his receiver tuned to receive messages from you must be able to hear you plainly at one adjustment point along the tuning coil, and practically be unable to hear you at any other point. Regulation three, of Section four, states "that if the transmitter is of such a character that the energy is radiated in two or more wave lengths, more or less sharply defined, as indicated by a sensitive wave meter, the energy in no one of the lesser waves shall exceed ten percentum of that in the greatest." In other words, the largest hump of the transmitting wave must be at least ten times as powerful as the next largest.

The sending wave must be sharply tuned. The fourth regulation states: "At all stations the logarithmic decrement per complete oscillation in the wave trains emitted by the transmitter shall not exceed two-tenths, except when sending distress signals, or signals and messages relating thereto." This statement sounds mysterious and formidable, but it is simply a statement of the limit of the damping permitted in the wave trains sent out from the aerial. If we could plot an accurate diagram or curve showing the values of the successive swings of the current in the aerial, we would have a curve something like Fig. 1, the curve in passing from a to b, b to c, etc., going through one complete oscillation. Without going through a lengthy and involved explanation it may be said that the expression simply means that the vertical height of the curve at a, must not be more than 1.22 times the height at b; and the height at b must not be more than 1.22 times the height at c, and so on. Unfortunately, it is impos-

sible to plot an accurate curve of the current in the aerial, and the only method of determining the value of the logarithmic decrement is by means of an instrument such as the decrement meter, or decremeter, a piece of apparatus far beyond the capacity of most amateurs' purses, and beyond their ability to construct. This limit to the damping is specified in order to provide a wave that may be tuned out without much trouble, as it is well known that a wave in which the damping is slight may be sharply tuned, and easily tuned out, while a highly damped wave may be heard all along your tuning coil and is nearly as loud at one point as at another. If your transmitter is so adjusted that the wave radi-

Form 736

APPLICATION FOR LICENSE AS RADIO OPERATOR

Department of Commerce and Labor

RADIO SERVICE

[Applicants should first read the act of August 13, 1912, and "Regulations Governing Radio Communication."]

November 10, 1912.

I, John Blank, born 1890, October,

at Chicago, Illinois,

present address: New York, New York,

New York, Battery Place, 1879,

apply for a license under the act of August 13, 1912, as—

1. Radio operator of the grade indicated below [place × before grade applied for]:

___ Commercial first grade.	X Amateur first grade.	___ Technical experiment grade.
___ Commercial second grade.	___ Amateur second grade.	___ Technical instruction grade.

2. I already hold the Department of Commerce and Labor operator's certificate of skill in radio communication,* issued at Brooklyn N.Y., on January 10, 1912

by Joseph Swinghammer, Chief Electrician.

3. My practical experience in radio communication has been — I have had, and operated a radio station for three years. The station has been equipped with receiving apparatus for three years, and pending apparatus for two years.

4. I have a practical knowledge of [place × before subjects studied and state other subjects, if so desired]—

X Berlin International Radiotelegraphic Convention and Regulations.	X United States Naval Radio Regulations.
X Act of August 13, 1912, to regulate radio communication.	X Theory of Wireless Telegraphy.
X Continental Morse Telegraph Code.	X Adjustment of the Apparatus.

5. I desire a license in order to operate a station of the following class or classes [mark with ×]:

___ Ship station.	___ Technical experiment.
___ Shore—public service.	___ Technical school.
___ Shore—limited commercial.	X General amateur.
___ Special high powered.	X Special amateur.

* Present certificate at examination. 11—4862

FIG. 2

ated by your aerial *does not* conform to this and the preceding regulations you will be notified in writing, by the Department of Commerce and Labor, and will be given an opportunity to readjust same so it does not violate them, before being subject to the penalties of $100 and $25 prescribed under "Penalties" in the law.

He must give absolute right of way to distress signals and all messages relating thereto, and must stop sending if told by a government or commercial station operator that he is interfering with the receipt of such signals or messages relating thereto, and must keep quiet until *all* signals or messages relating thereto have been finished. The penalty for

Form 757

APPLICATION FOR LICENSE FOR APPARATUS FOR RADIO COMMUNICATION (Land Station)

Department of Commerce and Labor

RADIO SERVICE

[Before filling out this application please read act of August 13, 1912, and "Regulations Governing Radio Communication."]

Date, November 10, 1912.

1. The undersigned, John Blank, being (*a*) a citizen of the State of New York, or (*b*) a company incorporated under the laws of the State of ....., present or principal business address: State New York, county New York, city or town New York, street West 147th, number 943, applies for a license to use or operate apparatus for radio communication under the act of August 13, 1912, at a land station, located in the State of New York, county of New York, city or town of New York, street Battery Place, number 1879.

2. The approximate transmitting range is 30 miles (with similar station).

3. The station in respect of which a license is hereby applied for {was* / ~~was not~~} actually operating on August 13, 1912, and, when requested, satisfactory proof to that effect will be produced. (Sec. 2, act of Aug. 13, 1912.)

4. For convenience land stations are divided into:

COAST stations, which transmit messages to vessels at sea or on the Great Lakes or whose operations may affect the transmission of messages between ship and ship or ship and coast.

INLAND stations which do not engage in or in any way affect maritime communication.

Please indicate on the list below by (×) at the left the purpose of the station for which a license is desired, and at the right whether it is a coast or inland station:

..... General public service station .....
..... Limited commercial station .....
..... Experiment station for development of radio communication .....
..... Technical or training school .....
..... General amateur station .....
..... Special amateur station .....
X Restricted amateur station Coast.
..... High-powered station for exceptional distances .....

John Blank
(Signature of applicant)
1879 Battery Place
New York, N. Y.
(Address.)

On receipt of this application, duly filled in, an application blank for the class of station in respect of which a license is desired will be forwarded.

*Strike out one to correspond with fact. 11—4899

FIG. 3.

failure to observe this regulation is a fine of $100, and for repeated offenses the forfeiture of his licenses in addition.

He must, in all cases, except in case of signals or radiograms relating to vessels in distress, use no more power than is necessary to carry his messages to the station with which he is communicating, or wishes to communicate. The penalty for violations of this is the same as in the case of distress signals or messages relating thereto.

He must not give out the contents of any message he receives or intercepts except to the person for whom it is intended or to another station which is to forward the message to its destination, unless required to do so in a court of law. The penalty, in this case, is a fine of not more than $250 or imprisonment for not more than three months, or both. This means that he must not keep, for the inspection of his friends or visitors, copies of interesting private messages he may receive or intercept. This does not apply to weather and stock reports or news items sent out broadcast, as press matter, to ships at sea.

He must not wilfully interfere (and wilful interference is one of the principal causes that made government regulation of radio communication necessary) with any radio communication. The penalty in this case is that the owner or operator, or both, may be subject to a fine of not more than $500 or imprisoned for not more than one year, or both, for interference with government or commercial radio communications, and probably the forfeiture of their licenses for interference with other amateurs. It is unlikely that the fine and imprisonment would be imposed for interference with amateurs, but definite information on this point is, as yet, not obtainable. However, the statement was made, unofficially, to the writer by a representative of the Department of Commerce and Labor, that canceling the licenses would probably be the action taken in cases of this kind of interference.

He must not transmit, or permit anyone else to transmit, while using his sending apparatus, any false or fraudulent distress signals or calls or any other false or fraudulent signal, call or message of any kind. The penalty for sending out a false distress signal or call is a fine of not more than $2,500 or imprisonment for not more than five years or both, for each and every such offense, and the penalty for sending out or permitting to be sent out any other false or fraudulent signal, call or message, is a fine of not more than $1,000 or imprisonment for not more than two years or both for each and every offense.

As previously stated, the amateur must have a station license if his station is equipped for sending, and he must also have a license as at least a first grade amateur operator. He may receive messages without either license if his station is equipped with receiving apparatus only, but he should obtain an operator's license, if he is capable, because an unlicensed person may not operate sending apparatus in any station, except as an apprentice actually serving under a licensed operator for the purpose of learning the art. Failure to enforce this provision subjects the owner of the apparatus, or the licensed operator in charge of it, to a fine of $100 as already mentioned.

Obtaining the Licenses

Send to the nearest Radio Inspector, for a copy each of the Regulations Governing Radio Communication, the Berlin International Radiotelegraphic Convention, the Wireless Law S-6412, and Forms 756 and 761. Do not attempt to fill out the blanks until you have read the Regulations, the Berlin Convention and the Law.

Radio Inspectors are stationed at the Custom Houses at the following points: Boston, Mass.; New York, N. Y.; Baltimore, Md.; Savannah, Ga.; New Orleans, La.; San Francisco, Cal.; Seattle, Wash.; Cleveland, O.; Chicago, Ill.

Operator's License

For an operator's license fill out Form 756 after the manner shown in Fig. 2 which is simply presented here as a guide, the names and addresses being fictitious throughout.

If you do not possess a certificate of skill as an operator, do not fill in the blanks in paragraph 2. If you have such a certificate, fill in the blanks from the information on the certificate, and take the certificate with you when you go to be examined. Communicate with the commandant at the nearest point at which examinations are held (a list of these is given on page 4 of the Regulations), to find out on what days the examinations are held. Then report (taking along your application, Form 756, and your certificate of skill if you have one), to the examining officer at the place selected, for examination. If you pass, the examining officer will issue a license to you. You should then advise the nearest Radio Inspector as to the date on which you passed the examination and the serial number and grade of your license.

Station License

For a general or restricted amateur station license, fill out Form 757 after the manner

shown in Fig. 3, the difference between a general and a restricted amateur station being that the latter is within five nautical miles of a government radio station while the former when filled out contains definite information concerning your station. Figs. 4 and 5 indicate the manner in which the form should be filled out, Fig. 4 showing the front of the

Form 762

AMATEUR APPLICANT'S DESCRIPTION OF APPARATUS

Department of Commerce and Labor

RADIO SERVICE

The following form of description of apparatus will be filled out and forwarded to the radio inspector by each applicant for an amateur's license for apparatus for radio communication of the general or restricted class (amateur applicants for a special license will use Form 761). The inspector, if necessary, will then arrange for the inspection of the station.

The information is desired primarily as the basis of the description of the apparatus to be inserted in the license, but many of the details are desired to facilitate the classification and particularly the inspection of stations, and will not, of course, be incorporated in the license. This form will not be open to public inspection.

I. GENERAL DESCRIPTION OF STATION.

Name of applicant, John Blank Age, 30

Address, 1879 Battery Place, New York, N.Y.

Location: State, New York; County, New York

City or Town, New York; Street, Battery Place; No. 1879

Name of naval or military station, if within five nautical miles of the station for which a license is desired, Fort Wood, N.Y. and New York Navy Yard.

II. POWER SUPPLY.

From city mains, generator, storage battery, etc., City mains.

Give following data, measured under normal sending conditions, key depressed:

Amperes, 4.5 (Measured in primary circuit of transformer or induction coil.) A. Volts, 110 (Measured across transformer or induction coil terminals.) V.

Power, 495 (Transformer input in watts.) W. Transformer or induction coil rated at 500 W.

Additional information: Power supply is 110 volts 60 cycles. Transformer is home made and has a secondary voltage of 10,000. The transmitter is inductively coupled to the antenna.

III. ANTENNA.

Type (T, 7, fan, umbrella, etc.), 7

Dimensions:

Height above ground, 75 feet. Total length (from apparatus) 250 feet.

Horizontal length, 220 feet. Vertical length, 30 feet.

Number of wires in horizontal part, 6 In vertical part, 6

Separation between wires, 3 feet. Length of ground lead, 80 feet.

Ground lead connected to Water and gas pipes.

Other essential dimensions, Vertical and horizon wires are stranded, 7 No 22 B+S Phosphor Bronze. Ground lead No 4 B+S Stranded Copper.

Is series condenser used in antenna for transmitting? yes.

Additional information: Antenna is 30 feet above roofs of a row of Brick Houses 45 feet high. The roofs are of metal and grounded.

X

11—1872

FIG. 4

is not. A nautical mile is 6,080 feet or 1.15 statute or land miles. After filling out the form, send it to the nearest Radio Inspector, who will then send you Form 762, which form, and Fig. 5, the back. The distances to the other stations with which you communicate, as stated on the back of the form, should be in miles although the form does not so

state. This form should then be sent back to the Radio Inspector, who will then arrange with you for an inspection of your station, if he considers it necessary, and will issue the license after the inspection, if he finds the station to conform to the Regulations, or without inspection if he thinks an inspection unnecessary.

The only expense you will have in connection with securing your licenses is the payment of your transportation and personal expenses in going to and returning from the government station to take your examination for the operator's license. There are no fees whatever in connection with either license.

(To be continued.)

Note:—The next instalment will tell you how to make your station conform to the law. —Ed.

IV. GENERAL INFORMATION.

Normal wave length used in sending .... 200 ..... meters. Other wave lengths, ... 150 ..... meters.
Note.—In many cases two or more waves are simultaneously radiated from the transmitter. Care must be taken that no wave exceeds 200 meters in length.

Normal day communicating range with similar station ..... 20 ... to ... 30 ..... miles.

Give location of stations with which communication is carried on:

No. 25 ..... Market ... Street. Distance, ... 9 ..... Owner, ... Frank Smith.....
No. 451 Broadway ... Street. Distance, ... 18 ..... Owner, ... Benj. Hancock.
No. 75 ..... King ..... Street Distance, ... 18 ..... Owner, ... John Kelly.....
No. 47 Larimer ... Street. Distance, ... 28 ..... Owner, ... Henry Gage...

Additional information. The first is in Newark N.J., the 2nd in Paterson N.J., the 3rd in Yonkers, N.Y., and the 4th in Long Branch N.J. I work the last one at night only. Have been heard as far as Fire Island, 40 miles.

..... John Blank.
(Signature of applicant.)

INSTRUCTIONS TO RADIO INSPECTORS.

Please send out this form in duplicate, one for the applicant's files, if he desires.

When filled in and returned, fill out the following:

Received by .....

at ..... Date, ...

Date of inspection (if inspected) .....

Licensed as { general / restricted } amateur station.

Serial No. .....

Date of issue, ...

Signature of Inspector, ...

The inspector will then retain a copy for his file, and forward the form to the Commissioner of Navigation, to whom the inspector should also submit a special report before issuing the license if he be in doubt on any matter concerning it.

11—4872

FIG. 5

WIRELESS STATION IN BOSTON

A novel window attraction in the new store of the William Filene Sons' Co., in Boston, is a complete Marconi wireless system which is being operated in full view of the public. Two show windows are devoted to working models. When the building, now unfinished, is completed, a practical working station will be operated, open to public patronage. The sending instruments will have an effective radius of from 300 to 1,000 miles.

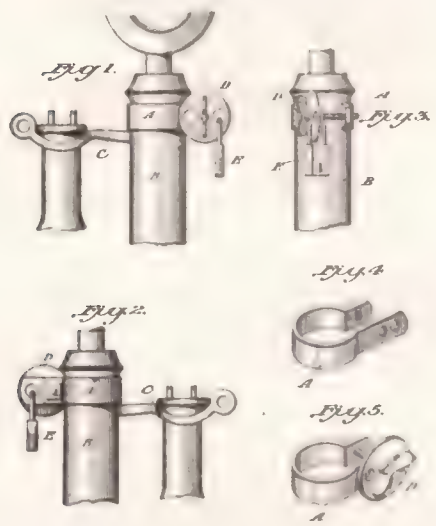
WIRELESS TO FIX TIME

As soon as the new wireless station at Arlington is completed, attempts will be made to verify the determination of the exact longitude of Washington through the exchange of wireless signals between the Arlington Station and the Eiffel Tower in Paris.

CHARLES H. BARD, OF MOUNT VERNON, NEW YORK, HAS BEEN GRANTED PATENT NO. 1,042,188, FOR ADJUSTABLE TELEPHONE INSTRUMENT LOCKING DEVICE.

The following invention relates to improvement in the method of locking telephone instruments to prevent their being used.

It has always been a mystery to us why there should be such a thing as a telephone lock. We ourselves, have never seen one used



and doubt very much that there is a market for such devices. Of course we understand that it may be good business to lock a telephone so that no one else can use it in the absence of the rightful owner or the person who should use it, but at best such a device will not prevent someone from using the line if he is really bent on using it.

It is the simplest thing in the world to tap the line from the terminals of the telephone box and the simple transmitter and telephone receiver will do very well for this purpose. The following is a description of the invention:

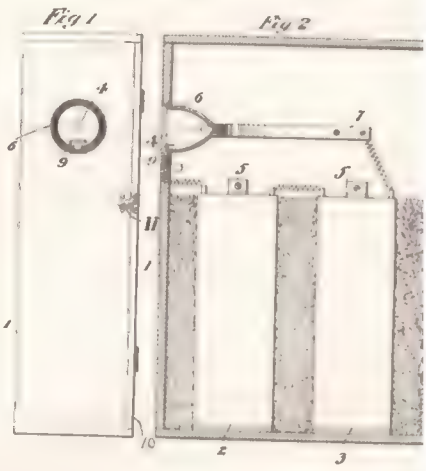
"The band A as shown in Fig. 1 is placed about the column B of the instrument above the receiver arm C, then the washer head thumb bolt D is inserted through the small bolt hole in the large flange or lip of band A as shown in Fig. 4, the end of the said bolt passing through this hole and also thro a similar hole in the flange on the opposite of the band A threading its way into the attached to the opposite side thereof as sh in Fig. 3.

The adjustment portion of this inventio attained by the operation of the washer th bolt D when in position as above descri By tightening the washer head thumb bol the band A is brought to any tension des as the diameter of band A is made sm than that of column B as shown in Fig For locking the instrument the washer h thumb bolt D is adjusted to a point whe is found that the receiver arm C canno moved, thus locking the instrument by venting the receiver arm C from mo either outward or upward and opening the strument when the receiver is removed."

While the idea is good there is of co nothing revolutionary about it.

WILLIAM D. BIXLER, OF FC WORTH, TEXAS, HAS BEEN GRANT PATENT NO. 1,042,191, FOR AN E TESTER.

The present invention shows a simple e tric egg tester and while nothing asolutely



is shown, the arrangement is good and device seems to have some points of super ity over others. It will be seen that when egg is placed in the opening, 6, it depres the spring contact, 9, which completes a

cuit of the two batteries, 5, 5, through the connector, 7, and lights up the incandescent lamp, 4, thus lighting up the inside of the egg. As soon as the egg is withdrawn the contact, 9, rises again, opening the circuit, and thus current is only used when an egg is being actually tested.

PATENT NO. 1,041,464, FOR A BATTERY CONNECTOR, HAS BEEN GRANTED TO JAMES MONROE HALL, OF SULPHUR SPRINGS, TEXAS.

It seems a pity how sane people can waste their time and money on devices such as the following. We have seen many queer electrical inventions, but the present one caps the climax. The only thing that can be said about the invention is that nobody probably ever was foolish enough to try it even if he had thought of it and the patent itself is one huge joke from beginning to end.

The inventor proposes to make some new fangled battery connector to connect batteries together by means of a crank handle carrying contact fingers. Just why he resorts to this cumbersome device no one knows, as the battery could be connected by hand at least five times as quick as with the present device. This device positively is in the way of making connections and actually hinders the person who is about to make the connection. At the same time all the operation usually necessary to connect batteries must be made here and the zinc poles must be connected manually, the same as the carbon poles.

The following interesting paragraph is the introduction to this patent:

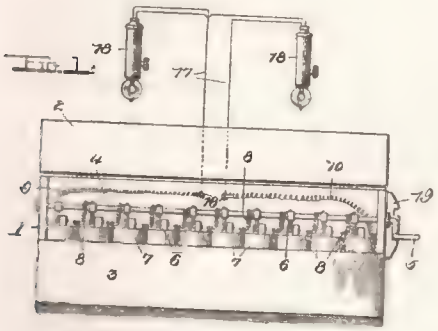
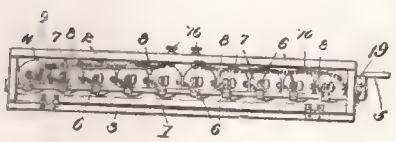
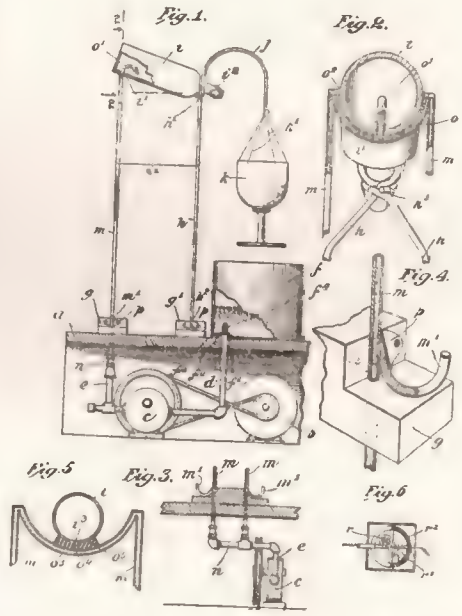


FIG. 2

My invention relates to new and useful improvements in means for generating power for use in connection with electric lighting and the like and more particularly to a battery connector therefor, and my object is to provide a device which may be readily and cheaply installed in all homes for use in any connection whatsoever, whereby the use of the city power plant may be eliminated.

PATENT NO. 1,041,149, FOR AN ADVERTISING DEVICE, HAS BEEN GRANTED TO CHARLES W. NICHOLS, OF RAHWAY, N. J.

The present invention relates to an advertising device and more particularly to a hydraulic device that will deliver a stream of fluid apparently unlimited in quantity from a receptacle of limited capacity, while concealing the mode of delivering the fluid to said receptacle.



This is, of course, not an electrical invention, and the only thing electrical about it is the small electric motor, b.

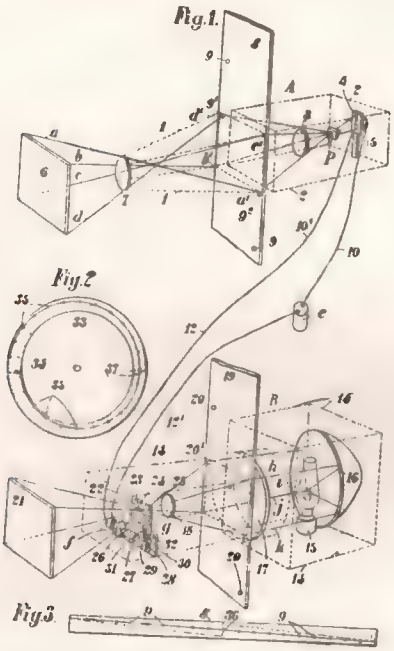
It will be seen that the inventor employs a pump, c, which drives the liquid through the center of the rod, m. This innocent looking rod, which seemingly has the purpose to support the bottle, i, is a strong piece of small tubing, but to all the world looks like a piece of wire. The liquid rising through this tube enters the bottle at the point, i^3, the bottle of course being bored at this point. The liquid will now flow from the bottle into the glass, thence to the tank, f, and again is pumped up into the bottle, etc.

We have seen some similar devices which we believe better than the foregoing one as even the layman unfamiliar with mechanism or electricity must come to the conclusion that the flow of liquid must rise either through the part, m, or, n, as there is absolutely no other way of it filling the bottle, i.

ANDERS CHRISTIAN ANDERSEN AND LAURITZ SOPHUS ANDERSEN, OF COPENHAGEN, DENMARK, HAVE BEEN GRANTED PATENT NO. 1,040,110, FOR SYSTEM OF TRANSMITTING IMAGES TO A DISTANCE.

The present invention purports to be a new idea on transmitting images to a distance. We give herewith the patent specification:

"Fig. 1 shows the installation collectively, comprising a transmitting station and a receiving station connected by a line. Fig. 2 shows a disk which may be employed in place of a ribbon for intercepting the luminous rays. Fig. 3 shows a perforated ribbon. Fig. 4 shows a side view of an arrangement for the separation of the colored rays proceeding from the image in the dark chamber. Fig. 5 shows a front view of this arrangement. Fig. 6 shows a side view of an arrangement serving for the coloration of the rays which form the image. Fig. 7 represents a front view of the same arrangement. Fig. 8 represents a ribbon used in place of the disk for separating the colored rays of the image in the dark chamber. Fig. 9 represents a ribbon employed in place of a disk for coloring the rays forming the image.



The installation comprises two apparatus functioning simultaneously and operating the one as a transmitter and the other as a receiver; these apparatus are moved separately by a motor device; their movements are synchronous and the regulation is effected by an arrangement of electrically actuated clockwork utilizing the line of the apparatus.

The transmitter apparatus A comprises a dark chamber 1, at the back of which is arranged a casing 2 in which is placed a lens 3 which receives the rays issuing from the dark chamber. These rays, after be fracted, meet a small cell of selen placed behind a prism p and moun the support 5. The screen 6 represe object (in reality farther removed fr chamber 1 and greater than the draw dicates). The rays a b c d coming fr screen 6 after refraction in the lens 7 chamber, form upon the endless rib a real image a' b' c' d' reversed a duced by the screen 6. This ribbon continuous, and opaque except at c perforated points arranged according diagonal line (Fig. 3). The distances rating the holes 9 depend upon the s the image in the dark chamber. holes are spaced apart in such a m that only one point can be located at instant within the field of the image i dark chamber. The ribbon 8 is dis from above downardly under the acti a motor mechanism with a conve speed, between the chamber and the ca it forms thus the end of the dark cha and separates it from the casing 2. luminous rays traversing the perfora of the ribbon fall upon the lens 3 and received by the small selenium cell 4. one point comes at each instant within field of the image as the figure show which the point 9' is in the field, the p 9^2 being outside. The point 9' is the and the point 9^2 the last point of the lique line formed by the perforations of ribbon. When the ribbon has been placed the whole of its length and passed the image in the dark chamber, of the points of perforation has crossed part of the image which is presented view and is displaced from a' to c'. For ample, if there is an illuminated point the image which is located opposite point 9' of the ribbon the luminous which arrives there traverses the ribbon falls upon the converging lens of the sm selenium cell; the same phenomenon is p duced by all the points of the image and cording as these points are more or l illuminated the selenium cell receives quantity of light more or less great.

The method whereby coloration is tained will be indicated below.

It is known that selenium presents electric resistance which diminishes accor ing as it receives a greater amount of ligl If one causes the current coming from t battery to pass into the selenium cells means of wires 10 and 10' there will be pu sations of current responding exactly to th variations of illumination of the seleniu cell. The conductor 10' is connected to th winding of an electro-magnet f placed the receiving station B and from there th current returns through the conductor 1 to the battery e.

The receiving station B consists of a pro jector apparatus 14 with a lamp 15 and concave mirror 16 with two lenses 17 and 1 a magnet f, an arm g and an endless ribbo 19 absolutely similar to the ribbon 8 of th transmitting station A. This ribbon com prises the same number of perforations 2 arranged obliquely. These perforation

combined with the electro-magnet f and with the arm g serve to separate the rays h i j k which proceed from the luminous source 15 and fall upon the screen 21. In front of the arm g is placed an arrangement (not shown) for producing the coloration of the image. The arm g is provided with a plate 22 comprising unequally transparent portions 23, 24, 25; the portion 25, which in the case shown in the figure is located at the focus of the rays h i j k is opaque, the portion 23 is completely transparent and the intermediate portion 24 has a transparency increasing gradually from the portion 25 up to the portion 23. The arm g is actuated by the magnet f by means of the core 26 of this electro-magnet; this core slides in the guide 27 and is connected to the arm g by a plug 28. The arm g is movable about an axis 29 to which is fixed a spring 30 which tends to apply the arm g against the stop 31; in this manner the opaque portion 25 is normally maintained at the focus. A stop 32 prevents the core from coming in contact with the yoke The ribbon 19 is displaced by the motor device like the ribbon 8 of the transmitter 8 at an exactly similar speed.

The projection on the screen 21 of the rays which form the image is effected in the same order as the reception by the selenium cell 4 of the rays coming from the image in the chamber 1. The points 9′ and 20′ of the ribbons 8 and 19 are located at exactly the same spot in the field of the image in the dark chamber and in the opening in the projector apparatus.

Consequent on the simultaneous operation of the electro-magnet f, the arm g and the ribbon 19, the rays falling upon the plate 22 are more or less absorbed according as the corresponding spot is more or less dark. If for example there is in the image an illuminated point which comes opposite the point 9′ of the ribbon 8, the ray traverses the hole and reaches the selenium cell 4 which according to this illumination causes a current to pass, more or less intense, in the wire of the electro-magnet f. This electro-magnet attracts with a corresponding force the core 26 which causes the arm g to turn around the axis 29 (see Fig. 7). In this manner, according to the illumination of the cell, the corresponding portion of the plate 22 will be brought to the focus of the luminous rays. The ray h proceeding from the luminous source 15 passes across the hole 20′ and gives on the screen 21 an image of which the luminous intensity corresponds to that of the object.

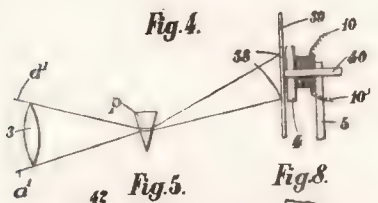
The synchronous displacement of the ribbon produces the movement of the holes 9′ and 20′. Accordingly the selenium cell receives other rays which are reproduced at the receiving station with the same luminous intensity and the same phenomenon is repeated for all of the points of the image according as the movements of the ribbons bring their perforations of the projector apparatus. In front of these two apparatus the two ribbons are constantly displaced their entire length at a predetermined speed. The rays are continually distributed at a speed greater than that of the perception of the human eye. Thus all the movements of the man, animals, etc., the image of which is reproduced, are perceived.

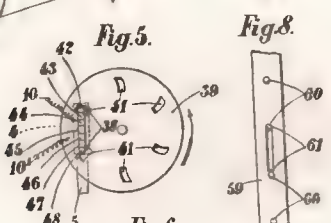
The screen 21 is supposed to be more removed from the projector apparatus and greater than indicated in the drawing. The reversed and reduced image given of the object in the dark chamber 1 on the ribbon is reproduced by the aid of the ribbon 19 by the pencil of rays h i j k issuing from the lamp 15 and refracted by the lenses 17 and 18. There is thus formed on the screen 21 a true and enlarged image of the object. Without changing the method, wheels or disks 33 may also be employed for dividing up the image, instead of ribbons (see Fig. 2, in which the dotted square 34 represents the size of the image). The holes arranged on the disk following the points 35 are arranged on a discontinuous spiral line. The order of distribution of the points is the same as in the case of the ribbons 8 and 19; the distance of the holes depends on the dimensions of the field of the two apparatus. In this manner the points which are located at the same instant in the field of the two apparatus will be corresponding points. When the disks 33 have made a complete turn all the holes have traversed the fields absolutely as in the case of the ribbons. The dimensions of the ribbons 8 and 19 and of the disks 33 vary within limits and may be unequal in length and breadth in such a manner that the distances separating the holes may be also different while the number of points of perforation remain always the same. The size of the holes varies also according to the dimensions of the image to be reproduced. An image of reduced size can be obtained by employing ribbons or disks of smaller dimensions. Without changing the method one may arrange the perforations of the disks and of the ribbons so as to follow oblique or spiral lines more or less continuous (see Figs. 2 and 3 in which the dotted lines show the ribbon 8 and the disk 33 divided by two oblique lines 36 or by spirals 37). By reason of the employment of perforations dividing the images by oblique lines or by interrupted spiral lines, the continuous movement of the disk and of the ribbons in the same direction produces an overlapping; the rays coming from the luminous source 15 mix and crowd one upon the other. accordingly a continuous image is obtained.

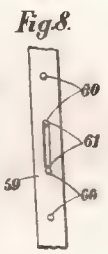
The separation of the colored rays of the images and the corresponding coloration of the rays in the transmitter apparatus and the receiver apparatus are obtained by the arrangement represented in Figs. 4, 5, 6 and 7. Fig. 4 shows in a side view the arrangement serving to separate the rays of the different colors forming the image before causing these to strike the selenium cell; for this purpose amounts of deviation are utilized given through the prism by the rays of different colors.

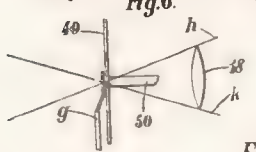
In the receiver apparatus A a prism p is employed on which all the rays d′, a′ fall, coming from the lens 3. After refraction

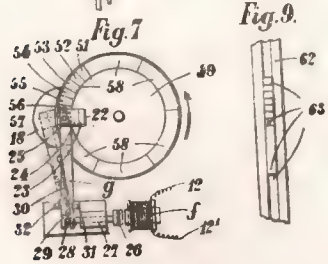
the different rays form a spectrum 38 on a disk 39 which receives a movement of rotation from the motor apparatus. Opposite the spectrum 38 and against the disk 39 is placed the selenium cell 4 on the support 5 and connected to the conductor wires 10 and 10'. The disk 39 is opaque, but on its edge it is provided with cavities or holes 41 (see Fig. 5 which shows in a front view the disk 39 with the spectrum 38 and the selenium cell 4). The width of the holes 41 corresponds to the width of each colored band while their distance corresponds to the total length of the spectrum 38. There is thus only one hole which can be located at each instant in front of the spectrum. The distribution of the colors of the spectrum is produced by the prism p according to the indices of refraction of the different rays in the following order: violet 42, indigo blue 43, blue 44, green 45, yellow 46, orange 47, red 48, which are obtained by the decomposition of white light. Natural objects do not emit one single color but several. For the transmitting apparatus A it is assumed that at each instant the light proceeding from a single point of perforation is sent toward the lens 3.











The luminous pencil of rays is dispersed through the prism p according to the rays which compose it and following the order indicated above. This pencil of rays is received by the disk 39. The disk 39, the holes 41 of which permit the rays to pass to the selenium cell, turns in the direction of the arrow with a speed such that the hole which is in the spectrum 38 traverses the whole spectrum during the period of emission corresponding to one point of the image in the chamber; according to the simple colorations forming the image of the point (red, orange, yellow, green, blue, indigo blue or violet) the elementary colored rays are sent to the selenium cell 4 in proportion as the hole of the disk is presented in front of them. When the hole has traversed the whole of the spectrum 38 another hole of the disk enters into the spectrum and the same thing is repeated for all the points of the image.

The arrangement employed for the coloration of the rays forming the image is seen in side view in Fig. 6 which shows a disk 49 mounted on the axis 50 and placed at the receiving station B at the focus of the rays h k proceeding from the luminous source and issuing from the lens 18; the disk 49 is placed behind the arm g and the plate 22 (see Fig. 7, which shows a front view of the disk 49, the lens 18 and the arm g as well as the electro-magnet f). On the disk 49 are placed colored and transparent bands, which by their coloration and their arrangement correspond exactly to the solar spectrum. The order in which they are placed is: red 51, orange 52, yellow 53, green 54, blue 55, indigo blue 56, violet 57, and the same colors are presented again in the same order on the whole periphery of the wheel; after violet comes red, and so on.

The disk 49 is divided into six colored spectra 58; the number of spectra should in fact correspond to the holes 41 of the disk 39 which also are six in number. The separating disks 39 and 49 turn with exactly the same speed in the direction of the arrows. In this manner if a hole of the disk 39 comes in front of a definite color of the spectrum 38 and thus causes a ray of this color to fall on the selenium cell, the corresponding color of the colored spectrum of the disk 49 is at the same moment placed at the focus of the receiving station. Further, the electro-magnet f attracts the core 26 with a force corresponding to the illumination, and this brings the corresponding portion of the plate 22 into the focus of the rays. In this manner the ray which has issued from the luminous source 15 and is received on the screen 21 corresponds exactly as to color and luminous intensity to the ray proceeding from the image in the dark chamber. The greater part of the points of the image in the dark chamber are formed by several colors but all the elementary rays are combined at the same point on the receiving screen; the time required for the passage of the spectrum is equal to the time required for the distribution of the rays which have issued from the point. The image is thus transmitted more quickly than the human eye is able to distinguish it; the images appearing enlarged and undergoing various changes caused by the movements of the men, animals and objects, by the variations of light and of coloration. The images thus obtained

will be altogether similar to the natural objects.

For separating the colored rays of the images endless ribbons 59 shown in Fig. 8 can be employed instead of the disks 39 and these ribbons are separated from one another, as in the case of the holes 41, by an interval equal to the length of the spectrum 61. The disk 49 can also be replaced by an endless ribbon 62 serving for the coloration (Fig. 9), this ribbon following the colors of the spectrum 63 arranged as the spectrum 58.

The comparison of luminous intensities of diversely colored rays is somewhat arbitrary, since it is difficult in the practice to appreciate the equality of brightness of two spots of different colors, say violet and red. For this reason it has been proposed to define the luminous intensity of a number of rays by means of the action on a selenium cell, but this definition is not adopted and if the ordinary and imperfect definition is accepted, it may be admitted that the red rays have a greater effect on the selenium. In every case, the operation and the construction of the described apparatus are not directly connected to the solution of this question. In fact, if the red rays diminish the resistance of the selenium more than the violet rays, the emission of current will be greater for the red rays than for the violet rays, but it suffices to make the red band 51 darker than the violet band 57 for realizing an exact reproduction of the red and violet colors. The same is true for the other colors. In practice, the toning of the bands 51—57 is determined by trials until satisfactory results are obtained.

The apparatus described above may if necessary be placed near the telephone. One can then, if one possesses the corresponding apparatus, see at the same time, with their living movements and their colors the image of the person to whom one is talking. By means of an interrupter it will be possible either to see or to talk by employing only the telephone wire. Finally this apparatus can be employed for verifying documents for exhibiting samples, machines in movements, objects and various merchandise and for every kind of control.

While the foregoing is quite an ingenious idea, we do not know whether the inventors have actually tried the arrangement, and we have some doubts as to the possibility of transmitting the actual colors by means of this device.

The patent, however, makes good reading to parties interested in television.

PATENT NO. 1,041,545 HAS BEEN GRANTED TO SAMUEL S. WILLIAMSON, OF PHILADELPHIA, PA., FOR SECONDARY MOUTHPIECE FOR TELEPHONE TRANSMITTERS.

It is a well known fact that there is seemingly an enormous market for a simple attachment to put over the ordinary telephone mouthpiece in such a way that a person may talk into the transmitter in such a manner that a person in the same room would not hear the conversation of the talking party. Very often business has to be transacted over the telephone when certain parties are in the same room, who should not hear the conversation carried on, and inventors have busied themselves to devise such an apparatus.

The following invention is an excellent idea based on the above requirements, and being exceedingly simple, it seems that it should find its way into the market shortly,

Fig. 1

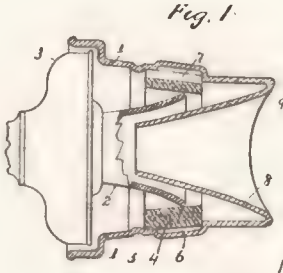
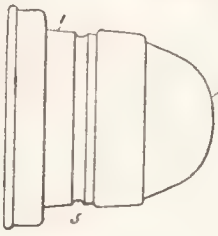


Fig 2.

Fig. 3.



provided it does all that its inventor claims for it.

The great trouble with the usual inventions on this plan is that the inventors find it almost impossible to do away with the speaker's breath, which naturally should pass out somewhere, and this is where the rub lies, for, if the air passes out, nine times out of ten, the sound will follow suit, and thereby the device becomes practically useless.

The inventor calls his device a secondary mouthpiece and claims that when it is placed over the usual transmitter, and when the mouth is applied to the part, 9, the voice will be entirely muffled; and the inventor also claims that the sound waves from the voice of the speaker are greatly intensified, thus increasing the facility with which a conversation may be carried on over the telephone.

He states:

"Figure 1 is a longitudinal section of my improved secondary mouthpiece, showing it in position over the ordinary mouthpiece, and surrounding the head of the transmitter. Fig. 2, a front view of the mouthpiece, and Fig. 3, an elevation of the secondary mouthpiece, taken at right angles to Fig. 1."

The inventor uses what he calls a muffler of a single piece of glass or other suitable material consisting of the body, 1,

which surrounds the ordinary mouthpiece, 2, of the telephone transmitter. The body itself is made so that it extends in the mouthpiece, 2, in the form of a funnel, as shown.

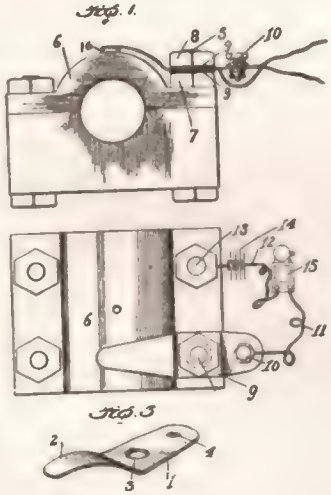
Four represents a ring or band of compressible or elastic material, such as cork, rubber or the like, set inside of the body and prevented from withdrawal by the annular shoulder 5. A clearance or space 6 is formed around the compressible ring so as to give it greater elasticity or range of action. The function of this compressible ring is to hold the device in place upon the instrument and divide the interior of the body into two compartments when the device is in use.

In applying the device to the telephone transmitter, the body is placed over the ordinary mouthpiece until the outer edges of said mouthpiece come in contact with the inner walls of the compressible or elastic ring, when by forcing the device home, the compressibility and elasticity of the ring will exert sufficient pressure upon the ordinary mouthpiece 2 to hold the device in the proper position as clearly shown in Fig. 1. This also makes a division between the inner and outer compartment in the body of the device cutting off the communication of air between the two except through the small groove 7 formed in the compressible ring.

We do not quite understand from this invention where the air escapes and although the inventor says it should be possible for it to escape through, 7, we are not quite sure that it will actually do this.

JAMES EDWARD ROGERS, OF BELOIT, KANSAS, HAS BEEN GRANTED PATENT NO. 1,041,514 FOR AN ELECTRIC ALARM ATTACHMENT FOR JOURNAL BEARINGS.

The present invention is a clever idea on



an electric alarm attachment for journal bearings.

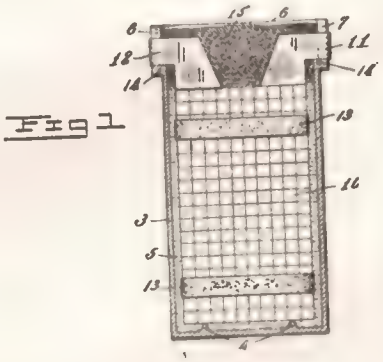
There is a good market for a simple device whereby a signal may be given when bearings become hot and this invention, simple in the extreme, seems to accomplish the desired results.

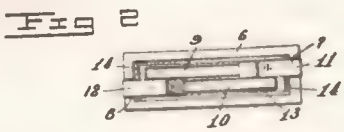
This again is one of these little inventions which, although not revolutionary, easily find their way into the market and we will not be surprised if the present invention will be a good money maker.

The idea as seen from the illustration is exceedingly simple and the main part is that the spring head, 2, lies upon a piece of fusible material, 16, which, when sufficiently heated, melts and the spring therefore will make contact with the top of the bearings, 6, thereby closing the circuit. The bell, 15, connected through the battery, 14, will then ring. Spring, 9, itself is insulated from the nuts, 7 and 8, by the insulating parts, 9. The disc may be formed of tallow which is quickly melted when the bearings become heated to a slight degree, but it is of course understood that any other fusible material can be used to good advantage.

PATENT NO. 1,040,055, FOR A BATTERY, HAS BEEN GRANTED TO ALVA E. THOMPSON, OF HASTINGS, COL.

This invention relates to storage battery, but more particularly to storage battery jars, the special object of the invention being to provide a battery having a jar adapted for





holding grids in such a manner that the lugs of the grids extend through slots and rest upon reinforced portions partially bounding these slots, and so disposed to give the jar additional strength where it might otherwise be weakened. The idea is to make the lugs come out on the side in preference to coming out through the top, to do away with corrosion.

Our illustration shows this quite well, and

after the pitch or sealing compound, 15, is poured on the top the inventor hopes to make a good fit between the lugs and the wall. We, however, are of the opinion that at best this is not a good mechanical arrangement, as the acid sooner or later will come through the opening.

As will be seen in Fig. 1, the inventor thickens the top of the jar as shown at 14, which increases the strength of the jar itself considerably. Aside from this the invention does not present anything new.

JOHN P. WILLIAMS AND HERMANN HUHN, OF NEW YORK, N. Y., HAVE BEEN GRANTED PATENT NO. 1,041,395, FOR ELECTRO THERMOSTATIC LINING FOR VAULTS, SAFES, ETC.

The following invention relates to an electro thermostatic lining for vaults, safes, and other structures to be protected, and it has for its object to provide an improved lining structure adapted for effective use in connection with general burglar-alarm systems.

We quote from the patent specifications as follows:

"In its operative characteristics, our improvements are adapted to insure combined protection both as a burglar-alarm and as a fire alarm, the thermostatic and other elements of the lining structure being suitably connected in circuit with the signals or bells of the burglar-alarm system.

Our invention is further designed to afford effective and certain protection against attempts to either cut into or drill or penetrate the protected structure and against attacks upon the same by the application of heat or flame for the purpose of burning or annealing the steel walls of vaults, safes or other protected structures.

In the drawings—Fig. 1 is a plan view, partly broken away, of a portion of the lining or plate member comprised in our main improvements, showing the relative arrangement of the superposed members and the circuit connections with the general features of an alarm system. Fig. 2 is a cross section on the line 2—2, Fig. 1. Fig. 3 is a cross-section, illustrating a modified arrangement of the structural members of the lining or plate and showing circuit connections as in Fig. 1. Fig. 4 is a plan view, partly broken away, of the modified construction shown in Fig. 3. Fig. 5 is a cross-section of another modification employing a thermostatic wire and showing circuit connections as in Figs. 1 and 2. Fig. 6 is a cross-section on the line y—y, Fig. 5.

Corresponding parts in all the figures are denoted by the same reference characters.

Referring to the drawings, 1 designates the plate which forms the outer wall of a vault, safe or other structure to be protected. This plate is usually of steel of suitable thickness. In our improved construction as shown in Fig. 1, a thermostatic plate, 2, consisting of suitable conducting and fusing metal or a composition, which will fuse or melt at a desired temperature and is affected by the action of heat or flame, is disposed against the inner surface of said plate 1 and contacts therewith. An insulating plate, 3, is disposed next to said thermostatic plate 2, and has perforations, 4, therethrough, the operative purpose of which will be hereinafter set forth. Arranged next to this insulating plate, 3, is another plate, 5, composed of conducting material, and this plate is preferably, though not necessarily, of fusible metal or material. Another plate, 6, of insulating material, is

Fig. 1.

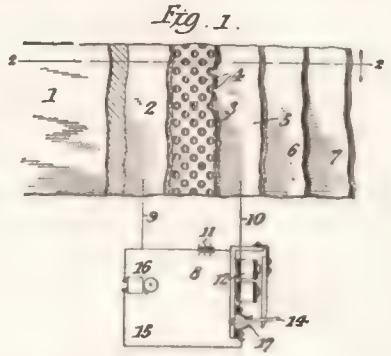


Fig. 2.

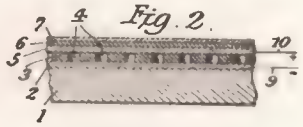
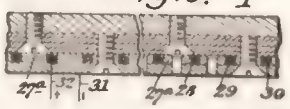


Fig. 6.



preferably disposed next to the plate 5, and will serve to protect the underlying elements against mechanical injury or the effects of moisture, etc., and next to this plate 6 is also preferably disposed a plate, 7, of sheet steel, to protect the complete electro-thermostatic lining structure and give a finished appearance at the inside surface. An alarm circuit, 8, has its terminals, 9 and 10, respectively connected with the conducting plates 2 and 5, and included in said circuit is the usual battery, 11, and magnets, 12, controlling an automatic drop, 14, which is adapted to close a local circuit, 15, having a bell or alarm signal, 16, therein. In case of an attack by the application of heat or flame upon the steel partition, 1, of the structure just described, the heat will cause the thermostatic plate 2 to fuse or melt and the fused metal will flow through the perforations 4 to contact with the conductor plate 5, thus closing the alarm circuit 8, which energizes the magnet 12, releasing the drop 14 and permitting it to engage with a contact, 17, of the local alarm circuit 15, to close said circuit 15 and cause the operation of the alarm bell or signal 16. Should an attempt be made to cut into or drill or penetrate through the elements of

the structure, such action would cause a short circuit through the contact of the penetrating tool with the conducting plates 2 and 5 and would establish a circuit as above and actuate the alarm."

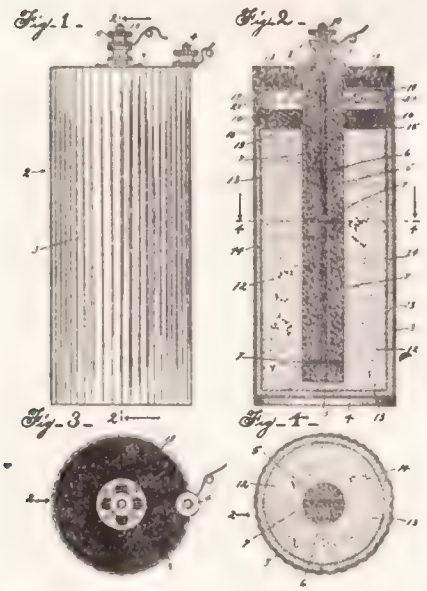
CARL JAEGER AND BERTHA JAEGER, OF LOS ANGELES, CAL., HAVE BEEN GRANTED PATENT NO. 1,039,949 FOR A PRIMARY CELL.

The present invention shows a new type of battery, which seems to have some points of superiority over similar ideas.

The inventors employ a carbon which is cylindrical and is provided with a longitudinal passageway, 6, and other lateral passageways, 7, leading to passageway, 6. The depolarizer, 12, may consist of a composition of peroxid of manganese, graphite, peroxid of lead, hydrate of aluminum, chlorid of ammonia, chlorid of zinc, and water.

The peroxid of manganese, graphite, and peroxid of lead, preferably in the proportion of 80 per cent., 10 per cent. and 10 per cent., respectively, may be first mixed together and the hydrate of aluminum, chlorid of ammonia, and chlorid of zinc, preferably in the proportion of 10 per cent., 70 per cent. and 20 per cent., respectively, may be mixed together with one pint of water per pound of the material and then mixed with the first mixture.

The electrolyte, 14, consists of a mixture of chlorid of ammonia, chlorid of zinc, chlorid of soda, chlorid of lime, and bichlorid of mercury, preferably in the proportions of 80 per cent., 10 per cent., 5 per cent., 4 per cent. and 1 per cent., respectively, to which may be



added a mixture of water, china clay, flour, glue and glycerin, sufficient in quantity to give the electrolyte a soft jelly consistency. The last mixture not only gives body to the electrolyte but also preserves it from evaporation and deterioration.

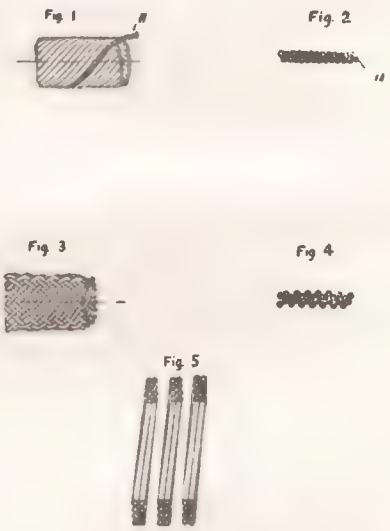
The writer of this article has had some experience with peroxid of lead in dry cells and extensive experimentation has shown that while the voltage is reduced about 0.02 volts no actual advantage is offered as the capacity of the cell is not increased whatsoever and its initial cost is increased.

The addition of bichloride of mercury, however, although an expensive addition, is a very good idea, as it tends to keep the zinc in a good state of amalgamation, as the writer of this article has found in practice.

We do not like the idea of the channels, as at best they usually become clogged up when the battery is made, and for that reason they are usually not of much use.

REGINALD A. FESSENDEN, OF BRANT ROCK, MASS., HAS BEEN GRANTED PATENT NO. 1,039,717 FOR HIGH-FREQUENCY ELECTRICAL CONDUCTOR.

The present invention relates to electrical apparatus for dealing with high-frequency



currents and more particularly to the construction of conductors such as the coils employed in wireless telegraph apparatus. Its primary object is to produce a more efficient form of coil or other conductor, and especially to construct a coil having a large amount of self-induction per unit of resistance.

To illustrate the foregoing invention a description of the illustrations will make this clearer.

We quote from the patent as follows:

"Figure 1 is a side elevation of a portion of a conductor for making coils and Fig. 2 is a cross-section of the same; Fig. 3 is a side elevation of another form of conductor and Fig. 4 is a cross-section of it, while Fig. 5 is a partial longitudinal section of a coil made by winding the conductor edgewise.

In order to produce a large amount of

(*Continued on page 968.*)

Simple Experiments in Chemistry

By Philip Edelman

9 Sulphuric Acid

Sulphuric acid is one of the most useful chemicals, and is manufactured on an enormous scale. The process consists in passing sulphuric dioxide, steam, air and oxides of nitrogen into large lead-lined chambers where the sulphuric acid is formed by the inter action. The acid, very much diluted, collects on the walls and floor of the lead chambers. It is then concentrated and purified. A new method of producing sulphuric acid has come to supersede the older chamber method. Platinum in the form of a mixture to give it a great surface is used to bring about the union of sulphur dioxide and oxygen, which compound is then dissolved in water or dilute sulphuric acid. The platinum is not affected and merely serves as a catalytic agent called a catalyzer.

Experiment. Collect a bottle full of sulphur dioxide, using copper and sulphuric acid, as in part 8. Also collect a bottle of nitrogen peroxide, using copper and nitric acid, as in part 5. Cover the bottles to prevent the gas from escaping. Now bring the open mouths of the two bottles together.

Result. White sulphur trioxide is formed. This new compound contains one part of sulphur and three of oxygen. Now pour water into the bottles and shake. Sulphuric acid is formed. This is an experimental imitation of the manufacture of sulphuric acid. To prove that sulphuric acid has been formed try the following experiment:

Experiment. Obtain some barium chloride and dissolve a little of it in distilled water. Unused portions of chemicals should be saved for future use. Pour some of the sulphuric acid into a test tube and add some of the barium chloride solution. The formation of a white precipitate proves the presence of sulphuric acid. This is a reliable test for sulphuric acid and for sulphates. Apply the test to some sulphuric acid, to solutions of sodium sulphate, and magnesium sulphate (Epsom salts). Note the white precipitates.

Sulphuric acid is an oily liquid having a specific gravity of 1.83 (commercial).

Experiment. Heat a drop of the acid in an open vessel. Note the odor of sulphur dioxide. Some sulphuric acid should be obtained for these experiments, as the acid formed in the first experiment is too dilute for the purpose.

Sulphuric acid has a strong affinity for water. Put a little water in a test tube and add a little acid. Note the heat. (See also part 3.) Dip an ordinary steel pen into this dilute acid in the tube and write a word on a scrap of paper, making the letters large. A stick can also be used for this purpose. Hold the paper with the writing over a flame, taking care not to burn the paper. The heat concentrates the acid and the concentrated acid chars the paper.

Experiment. Dip pieces of wood, paper and cloth into some concentrated acid and note the charring. The action is due to the fact that the acid draws the water out of this class of substances, leaving carbon. A similar action occurs when the acid comes in contact with the flesh, and causes painful sores. Care should be taken to avoid spilling any of the acid on the clothes, flesh or on furniture, etc.

Experiment. Boil up some sugar and water in a convenient vessel until a thick, clear solution of sugar syrup results. Pour this thick syrup into a beaker, or similar vessel, and allow it to cool. It is not desirable to use more than three-fourths of an inch of the syrup in a beaker. Now add an equal amount of concentrated sulphuric acid (dilute will not work). Stir the syrup and acid carefully but vigorously. If the directions have been followed, it will not be necessary to wait very long. There will be a violent inter action and the black carbon which forms will very likely overflow. The presence of free sulphur dioxide and steam should also be noticed. This is quite an odd experiment. The action depends upon the affinity of the acid for the water in the sugar syrup. The expanded volume of carbon which results is due to the fact

that the carbon is porous. The carbon can be cleaned out of the vessel or left, as desired.

Sulphuric acid is used in hundreds of important industries, large quantities are used to make artificial indigo, which is better and is superseding the natural indigo. Enormous quantities are used to make other useful chemicals, fertilizers, dye stuffs, etc. It is essential to many industries, including metallurgy, dyeing, bleaching, refining, electro-plating, for primary batteries and secondary batteries, etc.

The electrical uses of sulphuric acid are important, both as a conductor and as an electrolyte.

The various sulphates are salts which are formed by sulphuric acid. Copper and zinc sulphate are examples of these salts.

Experiment. Place a few pieces of zinc in a test tube and pour acid over them. Hydrogen is liberated and zinc sulphate forms. If copper is used copper sulphate forms. Heat is necessary in the last case. Copper sulphate is very important in the art of electroplating and electrotyping. It is also used in some primary batteries. A piece of iron dipped into a solution of copper sulphate becomes coated with metallic copper.

Carbon Disulphide

Carbon disulphide is another compound of sulphur, and contains one part of carbon to two of sulphur. It has already been mentioned. It is poisonous and has a disagreeable odor. It is very volatile and inflammable.

Experiment. Ignite a very small portion with care.

Experiment. Carbon disulphide can be used to dissolve old rubber forming a liquid rubber solution. It can be used to dissolve many other substances, waxes, gums, etc.

It can also be used to exterminate moles and woodchucks, etc.

Before leaving the subject of sulphur compounds and sulphur, it is well to point out the fact that *selenium* and *tellurium* are elements which belong to the sulphur group. The former is used in preparing cells sensitive to light, in conducting electricity. It has many of the properties of sulphur. Iron pyrites is a compound of sulphur and iron. Aside from its great commercial uses, it is used as the sensitive element in a detector for wireless telegraphy; in fact, many of the wireless detector crystals belong to the sulphur group. This does not mean that they all have sulphur as a component part, however.

Conclusion

This will conclude the present series. Only the high spots have been touched, but it is hoped that some of the important chemical properties have been made clear. The ambitious experimenter will scarcely be content with this brief insight into chemistry, but will continune through the remaining portions of inorganic, and perhaps organic, chemistry. The study is sure to prove very much worth while and even a scant knowledge of the general principles will prove of value to every reader.

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WIRELESS FROM SCANDINAVIA

The wireless inventor, Valdemar Poulsen, whose patents were recently purchased by an English company, intends to establish wireless communication between Scandinavia and America by way of an intermediate station in South Greenland.

MARY HAD A WIRELESS SET

Mary had a Wireless Set,
Its sparks were white as snow,
And everywhere that Mary went
That Wire-er-less would go.

It followed her to school one day,
Which was against the rule;
The teacher tried to put it out,
But the teacher was a fool.

She seized it by its spark gap,
But very soon let go.
She could not put that Wireless out
Because it shocked her so.

Next time she stood upon some glass,
But got a spark injection;
For when she stepped off to the floor
She made a ground connection.

Then Mary called her Wireless out
And put it in the yard,
Where it amused its little self
And got its Leyden jarred.

—*La Forge Walker.*

New Wireless Clubs

BOYS' EXPERIMENTAL CLUB

Amateurs on the Mesaba Range have organized a club, known as the Boy's Experimental Club. Its purpose is to promote the studies of electricity and aeronautics, also wireless telegraphy. The club now has a membership of about fifteen, and is growing rapidly. We will be pleased to receive questions concerning these subjects, and will do our best to give correct answers. The officers to date are: Amos Olson, president and treasurer; Floyd F. Whiting, vice-president and secretary.

Address all communications to the secretary, Box 214, Virginia, Minn.

WIRELESS ASSOCIATION OF ATLANTIC CITY

The Wireless Association of Atlantic City has been formed, and has elected the following officers for six months: President, Earle Godfrey; secretary, Kenneth Johnson; treasurer, N. J. Jeffries. The club was formed with the purpose of stopping interference and to promote interest in wireless telegraphy. The club holds meetings the first Friday of each month to discuss questions pertaining to wireless telegraphy.

SULLIVAN WIRELESS ASSOCIATION

The Sullivan Wireless Association was organized on August 28th, and has ten members.

The officers are: C. C. Hess, president; Chas. E. Monroe, secretary and treasurer.

The association desires to get in touch with other wireless organizations in the vicinity.

Address all communications to the secretary, Sullivan, Ill.

ATTENTION, MASSACHUSETTS AMATEURS

Amateurs in the art of wireless telegraphy living in Dorchester and Roxbury, and wishing to form a club, will kindly communicate with F. A. Ward, 540 Warren street, Roxbury, Mass.

METROPOLIS WIRELESS ASSOCIATION

The Metropolis Wireless Association was formed on June 15th last, for the purpose of helping to protect the amateurs' rights and to promote sociabilty among them.

The only requirements for membership are that applicant must be over 16 years of age, and own a station, sending, receiving, or both.

The officers as elected at the first meeting are as follows: Jos. T. Smith, president; Edgar Coene, vice-president; Wm. E. Meyer, secretary and treasurer.

Anyone interested in this organization will kindly address the secretary, at 181 West Sixty-third street, New York City.

We have eleven members now enrolled.

THE KILLINGTON RADIO CLUB

The Killington Radio Club of Vermont wishes to announce its organization on the night of September 19, 1912.

The club was started with six members, and elected the following officers: President, John L. Copps; vice-president, Howard Crane; secretary and treasurer, W. R. Canty, 36 Lincoln avenue, Rutland, Vt.; chief operator, R. H. Shaw.

The object of the association is to unite all those interested in wireless telegraphy that are within a radius of twenty-five miles.

Address all communications to the secretary.

FRONTIER WIRELESS CLUB

The Frontier Wireless Club, of Buffalo, has elected the following new officers for the year: President, Franklyn J. Kidd, Jr.; vice-president, A. Donald Atterbury; secretary and treasurer, George S. Franklin.

This month the club celebrates its first anniversary. The club is doing much for the interests of wireless telegraphy. We guarantee that no club has had a happier year than we have.

THE ROCKLAND COUNTY RADIO WIRELESS ASSOCIATION

The Rockland County Radio Wireless Association was formed on the 17th of July, and the following officers were elected: President, Marquis V. Bryant; secretary, Percy Haeselbarth; assistant secretary, Stanley Slinn; treasurer, H. Irving Sprott.

This club is composed of most of the members who belonged to the old Rockland County Wireless Association, which is no longer in existence.

EXPERIMENTAL CLUB OF CINCINNATI

The Experimental Club, of Cincinnati, has recently reorganized, with the following officers: C. Fender, president; A. Shumard, vice-president; W. G. Finch, secretary and treasurer.

All correspondence should be addressed to the secretary, 1214 Jackson street, Cincinnati, Ohio.

EVER READY WIRELESS CLUB

This club has recently been organized with the following officers: R. M. Ingersoll, president; T. Elliman, Jr., secretary. The headquarters of the club are at 167 East Seventy-first street, New York City. All boys wishing to join should communicate with the secretary. There are no dues.

TOLEDO WIRELESS CLUB

There has been recently organized in Toledo a new wireless club, which will be known as the Toledo Wireless Club. The officers of our club are: Carl Bruns, president; William Sisson, secretary and treasurer, 1024 Erie street, Toledo, Ohio.

GETTING BACK TO FIRST PRINCIPLES

(*Continued from page* 910.)

will adorn the walls of all wireless stations."

This is getting back to the first principles with a vengeance, but it certainly is tough on the frog.

Correspondence

I have noticed several mistakes contained in the article on Selenium and, etc., by Mr. Proner in the Dec., 1911, issue.

He says a small stick of selenium is equivalent to the length of a wire stretching for about 250,000 miles. What kind of wire Mr. Proner does not mention. I may say that the specific resistance of selenium is very high; its value may be placed at about 2,500 megoluns per centimeter cube.

As for the theory of the change of resistance of selenium is based upon two principals only, these are first given by Siemens. He ascribes the effect to the allotropic dissociation of selenium and the second due to Bidwell refers it to the formation of selenides at the junctions of the selenium with the metallic electrodes, upon the incidence of light.

As for the other theories stated by Mr. Proner will say that they were not given by any one to my knowledge. We will now consider the electrolytic theory. Selenium is very susceptible to moisture, and it is largely this taking up of moisture that produces the electrolytic effect. This can be overcome by placing the selenium cell in a vacuum as did Messrs. Ruhmer and Hammer.

The transmitting of photographs as explained by Mr. Proner is entirely incorrect. Those interested should read the article by Mr. Gernsback in the Dec., 1909, issue. This, as explained by Mr. Gernsback, is not as yet accomplished, but is only a solution to the problem. Also read the article on the Korn apparatus in the Jan., 1910, issue.

Last, but not least, the stopping and the starting a 5 h.p. motor, he says that, "the hand hindered the current from flowing through its circuit. I would suggest to Mr. Proner that he make this a little more definite as I have discussed this point with several of my friends and they came to the conclusion that the statement should not read as it does.

Hoping that the readers will look up the articles as mentioned herein, I remain, Very truly yours,

SAMUEL WEIN.

N. Y. City.

Regulations of the London Wireless Conference

An Act to regulate radio communication

Owing to the secrecy which surrounded the deliberations of the London Radio-telegraphic Conference, which finished its work on July 5th, no authentic details of the proceedings have been available. However, we are now able to present our readers with a full transcript of the London convention and the final protocol, and an abstract of the Regulations, which follow in order:

CONVENTION.

"The undersigned, plenipotentiaries of the governments of the countries enumerated above, having assembled in conference in London, have with common accord, and with the limitations of ratification, determined upon the following agreement:

"ARTICLE I. The contracting parties promise to apply the resolutions of the present convention in all radio-telegraphic stations (coast stations and marine stations) which are established or managed by the contracting parties and open for the service of public intercourse between the land and the ships at sea.

"They also promise to impose the observation of these resolutions upon all private enterprises authorized either to establish or to manage radio-telegraphic coast stations open to the service of public intercourse between the land and vessels at sea, or to establish or manage radio-telegraphic stations, whether open to the service of public intercourse or not, on board vessels carrying their flag.

"ARTICLE II. Every radio-telegraphic station established on land or on board a permanently anchored vessel and used for communication with ships at sea is called a coast station. Every radio-telegraphic station established on board a vessel other than a permanently anchored ship is called a ship station.

"ARTICLE III. The coast and ship stations are obliged to exchange radio-telegrams without regard to the radio-telegraphic systems used by these stations. Each ship station is obliged to exchange radio-telegrams with every other ship station without regard to the radio-telegraphic system used by these stations.

"However, in order not to hinder scientific progress, the resolutions of this article shall not interfere with the future use of a system of rado-telegraphy incapable of communicating with other systems, provided that this inability be due to the specific nature of the system, and not the result of arrangements adopted solely for the purpose of hindering intercommunication.

"ARTICLE IV. Notwithstanding the provisions of Article III, a station may be destined for a restricted public service determined by the purpose of the correspondence, or by other circumstances independent of the system used.

"ARTICLE V. Each of the contracting parties promises to join the coast stations to the telegraphic system (network) by special wires, or, at least, to take other measures insuring a rapid exchange between the coast stations and the telegraphic system.

"ARTICLE VI. The contracting parties will give each other the names of the coast stations and the ship stations under the scope of Article I, as well as all indications necessary to facilitate and to accelerate the radio-telegraphic exchange which will be specified in the regulations.

"ARTICLE VII. Each of the contracting parties reserves the power to prescribe or to admit, except in the stations under the scope of Article I, independent of the installation concerning which information is made public according to Article VI, other purview, which shall be established and managed for the purpose of special radio-telegraphic transmission, whose details needs not be made public.

"ARTICLE VIII. The management of the radio-telegraphic stations is to be organized so as to give as little disturbance as possible to other stations of the same kind.

"ARTICLE IX. The radio-telegraphic stations are obliged to give absolute priority to appeals of distress wherever they may come from, to reply in the same manner to these appeals, and to give them the precedence.

"ARTICLE X. The price of a radio-telegram includes, according to the case:

"1. (*a*) The 'coast price' which belongs to the coast station. (*b*) The 'ship price' which belongs to the ship station.

"2. The price for the transmission by telegraph, calculated according to the regular custom.

"3. The prices of transmission from coast stations or intermediate marine stations and the prices appertaining to special services asked by the sender.

"The rate of the coast price is subject to the approbation of the government to which the coast station belongs; that of the marine price to the approbation of the government to which the ship belongs.

"ARTICLE XI. The resolutions of the present convention are supplemented by a regulation which has the same power and is in force simultaneously with the convention. The prescriptions of the present convention and of the regulation relative thereto may at any time be changed by common consent of the contracting parties. Conferences of plenipotentiaries having power to change the convention and the Regulations will take place periodically; each conference will choose the place and the time for the next reunion.

"ARTICLE XII. The conferences are composed of delegates from the contracting countries. In the debates each country has only one vote. If a government represents its colonies, possessions or protectorates at the convention, the interior conferences may decide whether the whole or a part of the colonies, possessions or protectorates shall be considered as forming one country for the application of the preceding sentence. In every event the number of votes at the disposal of any government, including its colonies, possessions and protectorates, shall not exceed six. The following are considered as forming a single country for the application of the present article. (List omitted.)

"ARTICLE XIII. The International Bureau of the telegraphic union is charged to gather together and to publish all information relating to radio-telegraphy, to inform the convention of the demands for modifications, to promulgate the charges adopted, and in

these installations and stations are subject only to the obligations mentioned in Articles VIII and IX of the present convention. Always, when these installations and stations exchange public maritime intelligence, they shall conform, so far as the execution of this service goes, to the rules of the Regulations, so far as the method of transmission and the responsibilty are concerned. If, however, coast stations guarantee communications between fixed points at the same time that they communicate public correspondence to ships at sea, they are not subject for this service to the Regulations of the convention except so far as Articles VIII and IX are concerned. However, fixed stations which communicate between land and land may not refuse to exchange radio-telegrams with another fixed station because of the system used by the latter; always each country is absolutely free so far as the organization of the service between fixed points is concerned, and the determination of the correspondence done by the stations belongs to this service.

"Article XXII. The present convention shall be put into execution on July 1, 1913, and shall remain in force for an indefinite length of time and until the expiration of a year from the day of its denunciation. The denunciation has effect only in respect to the government in whose name it is made; for all the other contracting parties th convention remains in force.

"Article XXIII. The present convention shall be ratified and the ratification shall be deposited in London as soon as possible. In case one or more of the contracting parties does not ratify the convention, it will be none the less binding on the parties who shall have ratified it. In testimony whereof the respective plenipotentiaries have signed the convention by an exemplary which shall remain among the archives of the British Government and a copy of which shall be kept in Paris.

"London, July 5, 1912." (Signatures omitted.)

FINAL PROTOCOL.

"At the moment of proceeding with the signing of the convention agreed upon by the international radio-telegraphic conference of London, the undersigned plenipotentiaries agreed upon what follows:

"I. The exact nature of the acquiescence announced in the interest of Bosnia-Herzegovina not being as yet decided upon, it is recognized that if a voice is attributed to Bosnia-Herzegovina, a decision comes up as to whether this voice belongs to it because of Article XII of the convention, or if this voice is in accord with the third paragraph of this article.

"II. It has made the following declaration: The delegation from the United States declares that its government finds it necessary to abstain from all action concerning the prices, because the transmission of radio-telegrams, as well as of telegrams, in the United States, is managed, either entirely or in part, by commercial or special companies.

"III. It has also made the following declaration: The Government of Canada reserves the right to fix separately for each one of its coast stations a total ship price for radio-telegrams originating in North America and destined for a ship, the coast price mounting from three-fifths of the price on board to two-fifths of this total price.

"In witness whereof the respective plenipotentiaries have drawn up the present final protocol, which shall have the same force and the same weight as if these resolutions had been inserted in the text of the convention to which it refers, and they have signed it in an exemplary which shall be deposited among the archives of the British Government and a copy of general to take care of the administrative works attendant upon the interests of international radio-telegraphy. The expenses of this institution shall be met by all the contracting countries.

"Article XIV. Each of the contracting parties reserves the right to fix the conditions under which it will admit radio-telegrams passing through or destined for a station, either coast or ship, which is not submitted to the consideration of the present convention. If a radio-telegram is admitted, the regular prices are applicable to it. The right to pass is given to all radio-telegrams coming from a ship station and received by a coast station of a contracting country or accepted in transit by the government of a contracting country. The right to pass is equally given to all radio-telegrams destined for a ship, if the government of a contracting country has accepted them in transit from a non-contracting country, subject to the right of a coast station to refuse the transmission to a marine station of a non-contracting country.

"Article XV. The regulations of Articles VIII and IX of this convention are equally applicable to radio-telegraphic installations other than those included in Article I.

"Article XVI. The governments which have not taken part in this convention have a right to be admitted at their request. This request is made known diplomatically to that one of the contracting governments in which the last conference took place, and by it to all the others. This admission gives full rights to all the clauses of the present convention and to all the advantages herein stipulated. The admission of the government of a country having colonies, possessions or protectorates does not include the admission of the colonies, etc., unless a declaration to this effect has been made by the government. The whole of the colonies or one separate one may be admitted under the conditions of the present article and of Article XXII.

"Article XVII. The resolutions of Articles I, II, III, IV, V, VI, VII, VIII, XI, XII and XVII of the international telegraphic convention of St. Petersburg of July 10 to 22, 1875, are applicable to international radio-telegraphy.

"Article XVIII. In case of a disagreement between two or more contracting governments relative to the interpretation or execution either of the present convention or of the Regulations referred to in Article XI, the question may, by common accord, be submitted to arbitration. In this case each of the interested governments chooses another disinterested one. The decision of the arbiters is determined by the majority of the votes. In case of a tie the arbitrators shall choose another disinterested government. In case there is a dispute as to the choice, each government shall propose a disinterested contracting government, and lots shall be drawn between the disinterested governments. The drawing of lots shall take place on the territory of the government on which the International Bureau is working as provided in Article XII.

"Article XIX. The contracting parties promise to take or to propose to their respective legislatures the necessary measures to assure the execution of the present convention.

"Article XX. The contracting parties will inform each other as to the laws already passed or which are about to be passed in their countries relating to the object of the present convention.

"Article XXI. The contracting parties retain their absolute liberty relative to radio-telegraphic installations not included in Article I, and especially naval and military installations, as well as stations insuring communication between fixed points. All

which shall be delivered to each party.

"London, July 5, 1912."

SERVICE REGULATIONS.

I.—ORGANIZATION OF RADIO-TELEGRAPHIC STATIONS

No restriction is placed upon the choice of apparatus to be used by coast or ship stations, and these installations should correspond as far as possible with scientific and technical progress. Two wave-lengths, one of 650 meters and the other of 300 meters, are allowed for general public correspondence, and every coast station open to this service should be so equipped as to operate with these two wave-lengths, one of which is designated as the normal wave-length of the station. During the time it is open, each coast station should be ready to receive calls made at least at its normal wave-length. For the repetition of original messages and documents by ship stations to their respective governments, use is made, however, of a wave-length of 1800 meters. Each government may authorize the use in coast stations of other wave-lengths for the purpose of insuring long-distance service other than that of the general public correspondence, but established in accordance with the rules of the convention and with the reservation that the wave-lengths shall not exceed 600 meters or that they shall be greater than 1600 meters.

Stations used exclusively for sending signals for the purpose of determining the position of ships shall not use wave-lengths of more than 150 meters. All ship stations should be equipped for the use of wave-lengths of 600 meters and of 300 meters. The former is the length of normal waves, and cannot be exceeded except in the case of a sender on ship-board, who has always the right to designate by which coast station he wishes his radio-telegram to be sent; and in such case the ship station waits until that particular coast station is the nearest one. Other wave-lengths, less than 600 meters, may be used in special cases, with the approval of the administration which has jurisdiction over the coast and ship stations involved. During the entire time which any coast or ship station is open it should be able to receive signals or calls at its normal wave-length. Boats of small tonnage which cannot conveniently employ wave-lengths of 600 meters for transmission may be authorized to use wave-lengths of 300 meters, but they should be able to receive signals at a wave-length of 600 meters. Communications between two ship stations or between a ship station and a coast station should be exchanged in every case by means of the same wave-lengths, but when communication is difficult the two stations may, in a particular instance and by common accord, pass from the wave-length by means of which they ordinarily correspond to the other regulated wave-length. As soon as the communication is completed they shall resume again their normal wave-length.

The International Bureau publishes and periodically revises an official chart, naming the coast stations, their normal range, the principal navigation lines and the time normally taken by ships to traverse the routes between the different ports. The bureau establishes and publishes the nomenclature of radio-telegraphic stations according to Article I of the convention, as well as periodic supplements containing additions and modification. This list gives general information about each station, including the name, nationality, geographical position or name and nationality of ship, the call letters, normal capacity, radio-telegraphic system employed, length of waves (with normal wave-length underlined), character of service rendered, uses of service, and the coast or ship rate. The exchange of superfluous words and signals is forbidden to stations coming under Article I of the convention. Practice exercises are not permitted except when they do not interfere with the service of other stations, and should be made with a wave-length differing from those used for public correspondence and with the minimum of power. All stations are expected to exchange messages with the minimum necessary power.

All coast and ship stations should comply with the following requirements: (*a*) The waves sent out should be as pure and as little damped as possible. Direct spark discharges from antennas are not allowed except in cases of distress and also for certain special stations in which the primary power does not exceed 50 watts. (*b*) The minimum speed requirement is twenty words per minute, the average word being considered to contain five letters. New installations with a primary input of more than 50 watts should be equipped so that it will be readily possible to employ several ranges inferior to the normal range, the weakest being about 150 nautical miles. Old installations having a primary input in excess of 50 watts shall be changed to conform with the new rules as soon as possible. (*c*) The receiving apparatus should be able to receive wave-lengths provided by the present regulations up to 600 meters, with a maximum protection against disturbances.

Stations employed only to determine the position of ships should not operate within a radius of more than 30 nautical miles. In the case of ship stations power delivered to the radio-telegraphic apparatus, measured by the capacity of the station generator, should not under ordinary circumstances exceed 1 kw.; but power capacity greater than 1 kw. may be used if the distance from the nearest coast station is greater than 200 nautical miles, or, under exceptional circumstances, if the communication cannot be established except by augmenting the power. Every ship station owned or managed by private enterprise must hold a license from the government to which it belongs, and this license should be honored by all of the contracting governments as indicating the possession of an installation complying with these regulations.

Operators in charge of ship stations should possess a license from the governments to which the vessels belong, or, in case of necessity and for one voyage only, from another contracting government. First-class operators' certificates certify ability to regulate the apparatus and knowledge of its functioning, ability to transmit and receive messages by sound at a rate of not less than twenty words per minute and a knowledge of the Regulations. Second-class certificates will be issued to operators who qualify under the requirements of the first class except in failing to attain the speed requirements. Second-class operators will be allowed on boats which employ radio-telegraphic communication only for their own service and the correspondence of the crew, particularly on fishing boats, and on all boats, under the title of "assistant," provided there is in addition at least one operator holding a first-class certificate. At the ship stations having a permanent service there should be at least two first-class operators in attendance. No one may transmit a message from a ship station except a first-class or second-class operator, except in an emergency. Operators' certificates impose the burden of secrecy in relation to all correspondence. The radio-telegraphic service of all stations is subject to the authority of the captain.

Ship stations having a permanent service or limited hours of service are obliged to have radio-telegraphic

installations whose elements are placed under conditions of the greatest possible security. These safeguarded installations should be equipped with an adequate source of power, should be in condition to be placed quickly in service, should be capable of continuous operation for at least six hours and should have a minimum range of 80 nautical miles for ships giving continuous service at 50 nautical miles for those having limited hours of service. This safety apparatus is not required on boats whose regular apparatus already fulfills the foregoing conditions.

Infracton of the convention committed by a duly authorized station is punishable by the administration which has jurisdiction by revoking the license of the operator or the station, or both. In case of repeated infractions by the same station, when repeated complaints to the administration have had no effect, arbitration is provided for.

II.—DURATION OF SERVICE IN STATIONS

The duration of the service in coast stations is to be uninterrupted, as far as possible, day and night. Certain stations, however, may have a limited service. Each administration will fix the hours of service. Coast stations having limited service may not close before having transmitted all the radio-telegrams for ships in their sphere of action, and before having received from such ships all the radio-telegrams announced. Ship stations are divided into three classes: First, those having permanent service; second, those having limited hours of service, and, third, those not having stated hours of rest. During navigation stations of the first category should be always listening; those of the second category should listen during hours of service and also during the first ten mintues of every hour, and stations of the third class are never compelled to listen.

III.—THE WORDING AND FILING OF RADIO-TELEGRAMS

In the transmission of original radio-telegrams from a ship at sea, the date and hour of filing at the ship station are indicated in the preface, and in the re-transmission over the telegraphic system the coast station is inscribed as an indication of the station of origin, with the name of the original ship and, if possible, that of the last ship which served as an intermediary. The address of radio-telegrams sent to ships should be as complete as possible, and must conform to certain detailed rules given in the regulations.

IV.—COAST CHARGE AND SHIP CHARGE

The coast charge and the ship charge are fixed according to the charge per word on the basis of a fair remuneration for the radio-telegraphic work, with an optional addition of the minimum charge per radio-telegram. The coast price cannot exceed 12 cents per word, and that of a ship 8 cents per word. However, each administration has the right to authorize coast prices higher than the maximum in the case of stations having a range exceeding 400 nautical miles or stations operating under exceptionally burdensome conditions. The minimum optional price cannot be more than the coast or ship price of a ten-word radio-telegram. When an original radio-telegram sent from a ship, destined for the land, passes through one or two ship stations, the price includes, besides the charge of the originating ship or coast station and the telegraphic line, the ship price of each boat which has participated in the transmission. The sender of a radio-telegram from an inland station addressed to a ship station deposits the amount of the telegraphic and radio-telegraphic charges, and in addition a sum to cover possible charges at intermediate ship stations. Charges for radio-telegrams from ship to ship, passing through one or two intermediate coast stations, include the ship price on board both ships, the charge at the coast station or stations and the charge for transit between the two coast stations. The charges for radio-telegrams from ship to ship, without the intervention of a coast station, include the two ship charges plus the charge of any intermediate ship. The charges for intermediate ships or coast stations are the same as for stations of origin and destination. The country on whose territory the coast station serves as an intermediary for the exchange of radio-telegrams between a ship and another country is considered, in so far as the charges are concerned, as the country of destination and not as the country of transit.

V.—THE LEVYING OF CHARGES

The total charge for a radio-telegram is collected from the sender, except, at first, in the case of the express charges, and, second, in the case of combined or altered words declared non-admissible by the office or station of destination, when these extras are collected from the receiver. Ship stations should carry a list of tariffs on board.

VI.—THE TRANSMISSION OF RADIO-TELEGRAMS

The signals used are to be those of the Morse international code. The international distress signal is to be . . . — — — . . . repeated at short intervals and followed by the necessary indications.

Distress signals will take precedence over all other communications. Between two stations radio-telegrams of the same rank will be transmitted alternately, one by one, or in a series of several, following the instructions of the coast station, on the condition that the duration of the transmission of each series shall not be in excess of fifteen minutes.

The Regulations prescribe detailed rules at considerable length to govern the procedure in calling from station to station and dispatching messages. Every station which is about to send a message necessitating the use of great power must first send out a warning signal, — — . . — —, three times in succession, and shall not commence using the increased power until thirty seconds after the warning. As soon as a ship station picks up a coast station it is to indicate its approximate distance, its position, the next port for which it is bound and the number of radio-telegrams awaiting transmission. When a coast station is called by several ship stations simultaneously it decides upon the order in which these stations shall be allowed to exchange their correspondence.

When a radio-telegram contains more than forty words the sending station interrupts the transmission after each group of twenty words and sends a special signal, awaiting acknowledgment and repetition of the last transmitted word before it continues with the message. Coast stations occupied in transmitting long radio-telegrams should suspend transmission after every fifteen-minute interval and remain silent for three minutes before continuing again. When signals become uncertain it is important to have recourse to all possible expedients for securing transmission. For this purpose a radio-telegram shall be repeated at most three times, at the request of the receiving station. If then the signals are still indistinct, the message will be annulled.

In general ship stations send their radio-telegrams to the nearest coast station. However, if the ship station can choose between several coast stations practically equidistant, it gives preference to that one established on the territory of the country of destination, or to the natural destination of the radio-tele-

gram. A sender on shipboard has always the right to designate to which coast station he wishes his radio-telegram sent, and the ship station then waits until that coast station is the nearest one, but in certain exceptions transmission may be made through more distant coast stations, provided: (a) that the radio-telegram is destined for the country in which this nearest coast station is situated and comes from a ship registered in that country; (b) that the two stations use a wave-length of more than 1,800 meters; (c) that this transmission does not interfere with transmission by means of the same wave-lengths by a nearer coast station; (d) that the ship station is more than 50 nautical miles distant from all stations mentioned in the nomenclature. The distance of 50 miles may be reduced to 25 miles, with the reservation that the maximum generator power does not exceed 5 kw., and that the ship's station conforms with the regulations in respect to the character and quality of waves and the allowable power input.

VII.—DELIVERING OF RADIO-TELEGRAMS AT THEIR DESTINATION

If for any reason a radio-telegram coming from a ship at sea and directed to the land cannot be delivered to the addressee, notice of non-delivery is sent out to the coast station that first received the message. The latter in turn transmits the notice to the ship, if possible. If a ship to which a radio-telegram is addressed has not signaled its presence to the coast station within the time limit indicated by the sender, or when there is a delay of more than eight days, the coast station notifies the originating office, which in turn transmits word to the sender.

VIII.—SPECIAL RADIO-TELEGRAMS

The Regulations enumerate several special forms of messages, and stipulations in regard thereto, which will be accepted for transmission. These include radio-telegrams handled by mail over the land portion of their routes.

IX.—ARCHIVES

The originals of radio-telegrams, as well as the documents relating to them kept by the administration, are preserved, with all necessary precaution from the point of view of secrecy, for at least fifteen months.

X.—REDUCTIONS AND REIMBURSEMENTS

In all that concerns reductions and reimbursements application is made of the rules of the International Telegraphic Bureau, with due regard for the present regulations relating to special radio-telegrams. The time consumed in transmission, as well as delays in coast stations awaiting the ship of destination, is not considered in making reductions and reimbursements. If a coast station sends word to an originating office that a message cannot be transmitted to the ship for which it is destined, the administration of the country of its origin demands the repayment of the coast and ship charges to the sender.

XI.—CHARGES

The coast and ship rates have no relationship to the charges provided for by the International Telegraphic Regulations. The charges collected under these rates should be liquidated by the administration interested. In transmission over telegraphic lines a radio-telegram, from the standpoint of rates, is treated in conformity with the telegraphic regulations. The Regulations provide at some length for international settlements of the charges collected by the various administrations for the transmission of radio-telegrams.

XII.—THE INTERNATIONAL BUREAU

The supplementary expenditures resulting from conducting the International Bureau should not, in all that concerns radio-telegraphy, exceed $16,000 per annum, not including the special expenditures occasioned by the meeting of the International Conference. So far as contributions to expenditures are concerned, the contracting governments are divided into six classes, the members of each class being enumerated in the regulations.

XIII.—METEOROLOGICAL AND TIME SIGNALS

Each government shall take the necessary steps to transmit to its coast stations any meteorological telegrams containing news of interest to the regions in which they are situated. These telegrams, which should not exceed twenty words, are to be transmitted to ships which request such information. The charges for these meteorological telegrams will be paid by the ships to which they are sent. Meteorological observations made by certain ships designated for this work by the countries to which they belong may be transmitted once a day, charged as service notices, to coast stations authorized to receive and transmit them to certain designated meteorological offices. Time signals and meteorological messages will be transmitted in succession, so that the total duration of transmission will not exceed ten minutes, and in general every station whose operation would interfere therewith should be silent during this interval except in the case of distress signals and state telegrams. Each government shall also facilitate communication for the purpose of obtaining maritime information concerning matters of danger to vessels or information of general interest concerning navigation.

XIV.—MISCELLANEOUS REGULATIONS

Messages exchanged between ship stations should be carried on in such a way as not to disturb the coast stations, the latter having, as a general rule, the right of way as regards public communication. Coast and ship stations are to assist in the transmission of radio-telegrams when direct communication cannot be established between the originating station and the destination. The number of re-transmissions is limited to two. If a radio-telegram is to be sent partly over telegraphic lines or via radio-telegraphic stations belonging to a non-contracting government, it may be transmitted on the condition that the administration of the government in question has declared itself willing, when possible, to observe the convention and the Regulations, which are indispensable to the regular transmission of radio-telegrams, and upon the further condition that the charges are paid. Modifications of the present Regulations which shall be found necessary in further conferences shall be put in force on the date decided upon by each such conference. The provisions of the International Telegraphic Regulations are applicable, by analogy, to radio-telegraphic communication, in so far as they are not contrary to the present Regulations. For the application of the provisions of the radio-telegraphic regulations, coast stations are considered as stations of transit, except when the Regulations expressly stipulate that these stations shall be considered as stations of origin or destination.

On July 1, 1913, the present Regulations will become effective. These Regulations have been signed by the respective plenipotentiaries and a copy has been deposited in the archives of the British government.

Wireless Club Directory

Until further notice we will publish here from time to time a list of wireless clubs. These notices are inserted free upon receipt of proper information. Notices of the organization of all new clubs, as well as any changes of officers, etc., should be sent to us promptly.

Allegheny County (Pa.) Wireless Association—Leetsdale, Pa.

Alpha Wireless Association—Box 57, Valparaiso, Ind.

Amateur Experimental Association — Spokane, Wash.

Amateur Wireless Association of New Bedford—84 Dunbar Street, New Bedford, Mass.

Amateur Wireless Association of Schenectady—405 Lenox Road, Schenectady, N. Y.

Amateur Wireless Club of Geneva — 448 Castle Street, Geneva, N. Y.

Amateur Wireless Telegraphy Club of California—Box 55, Capitola, Cal.

Arkansas Wireless Association—Little Rock, Ark.

Atlanta Wireless Association—159 Capitol Avenue, Atlanta, Ga.

Berkshire Wireless Club—18 Dean Street, Adams, Mass.

Boise Radio Club—715 North 9th St., Boise, Idaho.

Boys' Experimental Club — Box 214, Virginia, Minn.

Bridgeton Wireless Club—275 Bank Street, Bridgeton, N. J.

Bronx Wireless Association—500 East 165th Street, Bronx, N. Y.

Brooklyn Wireless Club — 131 Ryerson Street, Brooklyn, N. Y.

B. W. T. A. Wireless Department—Scarsdale, N. Y.

Canadian Central Wireless Club—P. O. Box 1115, Winnipeg, Manitoba, Canada.

Cantabridga Wireless Club—351 Harvard St., Cambridge, Mass.

Cardinal Wireless Club — South Division High School, Milwaukee, Wis.

Chicago Wireless Association—4418 South Wabash Avenue, Chicago, Ill.

Cincinnati Wireless Signal Club—1839 Hopkins Street, Cincinnati, Ohio.

Colorado Wireless Association—1545 Milwaukee Street, Denver, Colo.

Danvers Wireless Association — Franklin Street, Danvers, Mass.

De Kalb Radio-Transmission Club—205 Augusta Avenue, De Kalb, Ill.

Dorchester Wireless Association—22 Harvard Street, Dorchester, Mass.

East Buffalo Wireless Club — 701 Walden Avenue, Buffalo, N. Y.

East Glenville M. E. Wireless Association —634 East 124th Street, Cleveland, Ohio.

East Tennessee Wireless Association—723 North Third Avenue, Knoxville, Tenn.

Electric St. Louis Wireless Club — 2008 Allen Avenue, St. Louis, Mo.

Ever Ready Wireless Club—167 East 71st Street, New York, N. Y.

Experimental Club of Cincinnati—1214 Jackson Street, Cincinnati, Ohio.

Fargo Wireless Association — 518 Ninth Street, Fargo, N. D.

Flushing Wireless Association—24 Madison Avenue, Flushing, N. Y.

Frontier Wireless Club — 1034 Elmwood Avenue, Buffalo, N. Y.

Fruitvale Wireless Club—2510 Fruitvale Avenue, Chicago, Ill.

The Germantown Wireless Club—5801 Germantown Avenue, Germantown, Pa.

Gramercy Wireless Club — 311 East 23d Street, New York, N. Y.

Granby High School Electricity Club, Granby, Mass.

Greater Boston Wireless Association—41 Lawrence Street, Wakefield, Mass.

Guilford County (N. C.) Wireless Association—Greensboro, N. C.

Hamlin Wireless Association—2729 Noble Avenue, Chicago, Ill.

Hannibal Amateur Wireless Club — 1306 Hill Street, Hannibal, Mo.

Haverhill Wireless Association—Haverhill, Mass.

Harriman Wireless Association—801 Clinton Street, Harriman, Tenn.

Hartford Wireless Association—320 Wethersfield Avenue, Hartford, Conn.

Independence Wireless Association — 214 South 6th Street, Independence, Kas.

Italian-American Wireless Experimental Club—146 Bleecker Street, New York, N. Y.

Inter-Mountain Wireless Association — 219 5th Street, Salt Lake City, Utah.

Killington Radio Club—36 Lincoln Avenue, Rutland, Vt.

Knights of Wireless—1271 East 35th Street, Flatbush, Brooklyn, N. Y.

Lexington Wireless Club—517 Throop Avenue, Brooklyn, N. Y.

Long Beach Radio Research Club — Long Beach, Cal.

Madisonville Wireless Club — 5609 Tompkins Avenue, Madisonville, Ohio.

Manchester Radio Club — 759 Pine Street, Manchester, N. H.

Metropolis Wireless Association—181 West 63d Street, New York, N. Y.

Mowa Wireless Club — 331 Pacific Street, Brooklyn, N. Y.

New England Wireless Association, Inc.—125 Milk Street, Room 99, Boston, Mass.

New Haven Wireless Association—27 Vernon Street, New Haven, Conn.

North Jersey Wireless Association—Hawthorne, N. J.

Oakland Wireless Club—916 Chester Street, Oakland, Cal.

Oklahoma State Wireless Association—Box 1448, Muskogee, Okla.

Oregon State Wireless Association—Lents, Oregon.

Pacific Radio Communicating Association—1109 Washington Street, Vancouver, Wash.

Pacific States Wireless Association — 288 Wilcox Avenue, Los Angeles, Cal.

Pacific Wireless Club of Oregon—405 East Market Street, Portland, Ore.

Plaza Wireless Club—156 East 66th Street, New York, N. Y.

Power City Wireless Association—Niagara Falls, N. Y.

Progressive Wireless Club—Seattle, Wash.

Progressive Wireless Club — Poplar Bluff, Missouri.

Ranger Nautical Signal and Wireless Club —Nautical Training School, State House, Boston, Mass.

Rochester Wireless Association—Rochester, N. Y.

Rockland County Radio Wireless Association—54 Catherine Street, Nyack, N. Y.

Roslindale Wireless Association—962 South Street, Roslindale, Mass.

Sacramento Wireless Signal Club—2119 H Street, Sacramento, Cal.

St. Paul Wireless Club—1911 Ashland Ave., St. Paul, Minn.

Santa Cruz Wireless Association—184 Walnut Avenue, Santa Cruz, Cal.

Southern Wireless Association—1435 Henry Clay Avenue, New Orleans, La.

Springfield Wireless Association—323 King Street, Springfield, Mass.

Spring Hill Amateur Wireless Association —2 Benton Road, Somerville, Mass.

Sullivan Wireless Association—Sullivan, Ill.

Technical Wireless Association—1206 East Capitol Street, Washington, D. C.

Texas Wireless Association — 1212 Prairie Avenue, Houston, Texas.

Toledo Wireless Club—1024 Erie Street, Toledo, Ohio.

Tri-County Wireless Association — Greenfield, Ohio.

Tri-State Wireless Association — Memphis, Tenn.

United Wireless Relay Club — 102 High Street, Passaic, N. J.

Waterbury Wireless Association—26 Linden Street, Waterbury, Conn.

Waynesburg College Wireless Club — Waynesburg College, Pa.

Welcome Wireless Association—185 Chauncey Street, Brooklyn, N. Y.

Westchester Wireless Association—37 West Main Street, Tarrytown, N. Y.

Western Division High School Wireless Association—Milwaukee, Wis.

Wildwood Wireless Association—110 East Pine Avenue, Wildwood, N. J.

Wireless and Electrical Association—Lindsborg, Kans.

Wireless Association of Atlantic City—Atlantic City, N J.

Wireless Association of Buffalo, N. Y.—142 Dorchester Place, Buffalo, N. Y.

Wireless Association of Canada—189 Harvard Avenue, Notre Dame de Grace, Montreal, Quebec, Canada.

Wireless Association of Central California —860 Callish Street, Fresno, Cal.

Wireless Association of Easton, Pa.—123 North Main Street, Phillipsburg, N. J.

Wireless Association of Greater Fort Smith —Greater Fort Smith, Ark.

Wireless Association of Illinois—303 North 8th Street, Marshall, Ill.

Wireless Association of Milwaukee — 824 Nineteenth Avenue, Milwaukee, Wis.

Wireless Association of Montana — 309 South Ohio Street, Butte, Mont.

Wireless Association of New Orleans — 2022 State Street, New Orleans, La.

Wireless Association of Pennsylvania—Odd Fellows' Temple, Philadelphia, Pa.

Wireless Association of Savannah—303 Price Street, Savannah, Ga.

Wireless Association of Southern California—935 Denver Avenue, Los Angeles, Cal.

Wireless Association of Woodbury — 28 Penn Street, Woodbury, N. J.

Wireless Club of Baltimore — 728 North Monroe Street, Baltimore, Md.

Wireless Society of Springfield—P. O. Box 562, Springfield, Mass.

Wireless Telegraph & Telephone Association of U. S.—Boys' Club, 161 Avenue A, New York, N. Y.

Young Edison Society—Rogers, Ark.

Y. M. C. A. Wireless Club—211 West Fourth Street, Williamsport, Pa.

Zanesville Wireless Association—105 South Seventh Avenue, Zanesville, Ohio.

SIMPLE EXPERIMENTS IN ALTERNATING CURRENTS

(*Continued from page 921.*)

rent; but, most of them being rather complicated, they do not fall within the scope of this article, and hence will not be described.

Our Wireless Station and our Laboratory Contest will be continued every month until further notice. The best photograph for each contest is awarded a monthly prize of Three (3) Dollars. If you have a good, clear photograph send it at once; you are doing yourself an injustice if you don't. If you have a wireless station or laboratory (no matter how small) have a photograph taken of it by all means. Photographs not used will be returned in 30 days.

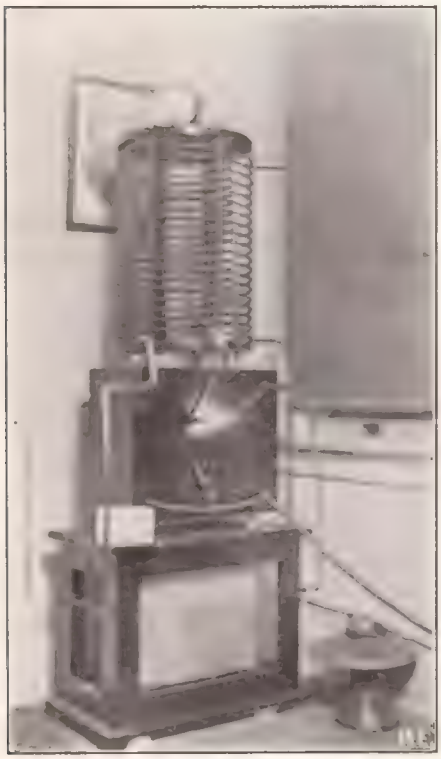
PLEASE NOTE THAT THE DESCRIPTION OF THE STATION MUST NOT BE LONGER THAN 250 WORDS, AND THAT IT IS ESSENTIAL THAT ONLY ONE SIDE OF THE SHEET IS WRITTEN UPON. SHEET MUST BE TYPEWRITTEN OR WRITTEN BY PEN. DO NOT USE PENCIL. NO DESCRIPTION WILL BE ENTERED IN THE CONTEST UNLESS THESE RULES ARE CLOSELY ADHERED TO.

It is also advisable to send two prints of the photograph (one toned dark and one light) so we can have the choice of the one best suited for reproduction.

This competition is open freely to all who may desire to compete, without charge or consideration of any kind. Prospective contestants need not be subscribers for (the publication) in order to be entitled to compete for the prizes offered.

FIRST PRIZE THREE DOLLARS

Below is shown the private installation of Earl Hanson, of California. The



HANSON STATION SENDING

receiving instruments are of the latest type and consist of as follows: Blitzen loose coupled tuner, large capacity variable condenser for primary of tuner, smaller variable condenser for secondary, fixed condenser and silicon detector. All connections for same are composed of stranded flexible copper wire. It is a well-known fact that high frequency currents travel on the surface of conductors only (called skin effect) so it is necessary to reduce the resistance to a minimum; and this is done by making the connecting cables of a great many small insulated wires in parallel. No antennæ switch is used for the reason that it is unnecessary and bothersome to swing over every time communication is desired. An anchor gap in the ground lead is shunted by two wires that lead to the receiving instruments, and if there is any high potential energy accumulated in the receiving circuit it is taken up by auxiliary gaps placed at various points in the circuit. This is an ideal break system and does away with the customary electro-magnets, etc. The anchor gap is shown on the extreme left of the photograph.

A 2-kw. closed core transformer, variable plate capacity, sending inductance, air-cooled oscillator and hot-wire meter with the necessary switches, reactance and Morse key comprise the transmitting set. The closed oscillatory circuit is wired with copper ribbon which raises the efficiency of the outfit.

The antenna consists of six stranded copper wires (compromise type) 108 feet high and 200 feet long, insulated

HANSON STATION—RECEIVING

with Electrose strain insulators. The ground capacity is made up of twenty stranded cables radiating from the station in all directions for 100 feet, and buried about two feet deep and brought into the station by a large copper bar to which they are soldered.

EARL HANSON,
California.

HONORABLE MENTION

Herewith is a photograph of my wireless station. My sending set is as follows: ½-kw. transformer with vibrator; helix consisting of 22 feet of No. 6 copper wire, wound on a hard wood frame; rotary spark gap; glass plate condenser moulded in paraffine; reconstructed key to carry 30 amperes; necessary switches; small ½-inch coil to send

LA PLANT STATION

to the small set at our residence; small spark gap; 6-volt incandescent lamp to obtain resonance between the closed and open circuits. The receiving set consists of Clapp-Eastham new receiving transformer made of hard rubber with the secondary revolving inside the primary instead of sliding in as the old model did; ferron detector; fixed condenser; rotary variable condenser; audion detector; pair of 2,000 ohm and a single 1,000 ohm Brandes receivers; buzzer test; and rheostat regulator. The set has nine switches all told.

The aerial is 85 feet high and consists of four No. 14 copper wires 160 feet long. They are all connected across at each end, and each wire has a lead from the middle to a pole just outside the entrance where they are all connected to the ground by means of a No. 4 B. & S. cable. This cable is cut in through a 100-ampere SPDT switch. The lead-ins are of No. 6 cable through the window in large porcelain tubes filled with paraffine.

We have sent 60 miles at night, and have heard San Francisco (PS), San Antonio (SA), Philadelphia, Galveston, and all the stations around the Great Lakes. My call letters are SA.

G. L. LA PLANT,
Iowa.

HONORABLE MENTION

Having never seen a picture of a station in this part of the country in the

BASTIAN STATION

contest in *Modern Electrics*, I enclose one of mine, which consists of the following:

Receiving: Loose coupler; two E. I. Co.'s, variable condensers; one E. I. Co.'s Junior fixed condenser, which is connected across the 'phones a pair of Holtzer-Cabot's 2,000 ohms; perikon and Clapp-Eastham ferron detectors, either of which can be thrown in by a rapid throw switch; buzzer test operated by the key on the front of the table.

Sending: Adams-Morgan ½-kw. closed core transformer; helix, brass ribbon on mahogany frame; rotary spark gap; condenser made up of eight full size leyden jars, which are in the rack supporting the helix and spark gap; aerial switch of the "United" quick throw

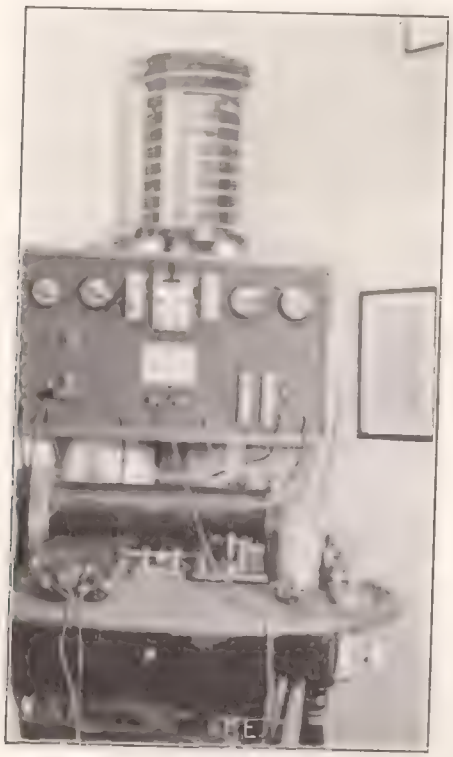
type; D. P. S. T. fused switch for connecting the transformer and starting the gap.

The aerial is a 50-foot, 4-wire flat top, wires spaced 18 inches apart. I use Clapp-Eastham hook-up on the receiving side and Murdock on the sending side which give excellent results with the apparatus named.

R. R. BASTIAN,
Louisiana.

HONORABLE MENTION

Enclosed you will find a flashlight photograph of my wireless station, which



DONOHUE STATION

I have constructed from my own ideas of a model wireless station.

My receiving set consists of the following: One 4,000 meter tuning-coil; one rotary type variable condenser; one silicon and perikon detectors; one 100-ohm sounder, which I use in connection with an auto-coherer, which works under favorable conditions up to thirty miles; one fixed condenser; one pair of Murdock's 4,000-ohm head receivers.

My sending set consists of the following: One "Electro box" type one inch spark coil; one zinc spark gap; one wireless key; one Holtzer-Cabot variable sending condenser; one 12-plate sending condenser, 4 x 5; one sending helix.

My source of current is obtained from twelve red seal dry batteries which are stored under the table.

My aerial consists of four aluminum wires 130 feet in length and 75 feet in height.

I communicate with my friends in the neighborhood and receive under favorable conditions up to 500 miles.

I am a subscriber to *Modern Electrics* and would advise anyobdy interested in wireless to subscribe for it without further delay, and as for myself I could not be without it. My call letters are "PD" and I would be greatly pleased to have other stations of my own standing to call me up any evening.

PHILLIP DONOHUE,
New York.

HONORABLE MENTION

Please find enclosed a photograph of my wireless set.

Sending set is composed of a 1-inch coil, a ½-kw. transformer coil, one adjustable and two fixed condensers, an electrolytic interrupter, and a key with dimes riveted on the points.

My receiving set comprises large and small loose-couplers, tuner, variable condenser, silicon and audion detectors and 2,000-ohm 'phones.

With a 60-foot, 6 strand aerial I get good results.

I have made some of my instruments

PULLIAM STATION

with the aid of *Modern Electrics*, of which I am a reader.

H. A. PULLIAM,
Kentucky.

HONORABLE MENTION

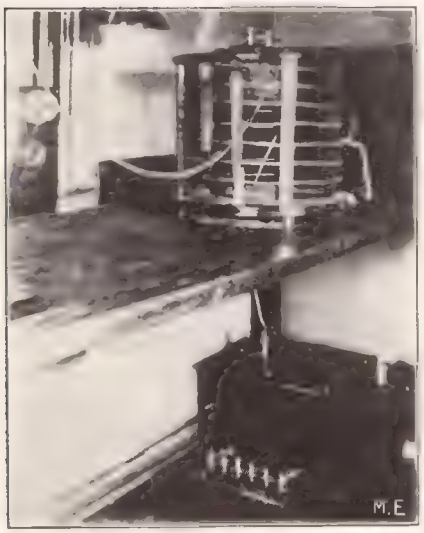
Enclosed please find photos of my wireless set.

The sending set consists of a 1-kw. closed core transformer, operated on 220 volts; helix of No. 6 copper wire, spark gap on top; condenser, sixty plates of glass, 10 x 12 inches with ¼-inch of crude vaseline between plates (condenser in box next to helix) impedance (on floor next to transformer) and key with dime contacts.

The receiving set has a loose coupler, double slide tuner, three variable condensers, silicon and galena detectors,

STEVENS STATION—RECEIVING

Brandes 2,000-ohm 'phones. Push button for working test out may be seen next to the receiver binding posts.



STEVENS STATION—SENDING

Aerial is eighty feet high, and one hundred feet long, composed of four wires of stranded aluminum spaced three feet apart.

All the instruments are home made

STEVENS AERIAL

except 'phones, key and switches. The transformer was made over from a 110-volt, direct current spark coil. An old piano stool seat came in handy for the helix disks and a wooden chopping bowl placed over the spark makes a good muffler. I will be glad to communicate with amateurs within range. Call letters "BV."

HAROLD STEVENS.
Illinois.

HONORABLE MENTION

Enclosed please find photo of my wireless station. On the right of the stand is the transmitting set and on the left is the receiving set.

The transmitting set consists of a ¾-inch spark coil, a spark gap, a glass plate condenser size 12 by 9 inches, helix which is wound with 20 feet of No. 8 copper wire, and key.

The receiving set consists of a single slide tuning coil, silicon detector, and a 75-ohm receiver. I also have a buzzer test.

My aerial consists of four No. 16 copper wires, 2 feet apart and is 40 feet high and 70 feet long.

All the instruments are of my own

construction except the spark coil and the receiver. I have all the necessary switches. I am a member of the Wireless Association of America.

ESTLING STATION

DAVID A. ESTLING,
Minnesota.

HONORABLE MENTION

I am enclosing a photograph of my wireless station.

My aerial is made of copper wire, 200 feet long, 40 feet high 5 wires, spaced 4 feet apart. My ground is on gas and water pipes. I also have a lightning ground.

SOUTHWORTH STATION

For receiving, I have a loose-coupler, a tubular variable condenser, a fixed condenser, silicon detector, a pair of 2,000-ohm Brandes "Superior" 'phones, and a buzzer test.

For sending, I have a 1½ inch spark coil with a special high-speed vibrator, a flat glass plate condenser, key, helix, and a 6-60 storage battery.

I am a constant reader of *Modern Electrics* as will be seen by the pile under the receivers.

ARTHUR P. SOUTHWORTH,
Massachusetts.

HONORABLE MENTION.

Enclosed please find photo of my wireless station. The receiving set consists of a D. S. tuner, tubular variable condenser, which is at the extreme left, fixed condenser and silicon detector in front of tuner, and a small loading coil to the right. A pair of 2,000 ohm 'phones completes the set.

The sending set has a glass plate condenser (12 plates) and has a 1-inch spark coil on top. The helix, with a zinc spark gap on top, is at the back of the table. The key is in front of condenser. The D. P. D. T. switch and ground switches are on the right wall. I can hear all the boats on the lakes and all stations within 400 miles with this outfit. My aerial is composed of four wires, 100 feet long and is 45 feet high. All the apparatus is home-made with exception of the coil and 'phones.

SCHARDT STATION

CARL M. SCHARDT,
Ohio.

WIRLESS IN ALASKA

The government wireless telegraph stations at Fort Gibbon and Nulato, Alaska, have been changed from 3 kw. to 10 kw. The 10-kw. equipment is of the Telefunken quenched spark system, which is stated to be superior to the ordinary spark in overcoming the excessive static disturbances encountered in that region during the summer months. Mr. Murphy, electrical engineer of the United States Signal Service installed the two new stations.

Flying Sparks

THE RIGHT IDEA

The Photographer: "What's the idea of all those bandages?"

The Victim: "Oh, I merely had a fight with 'Tornado Jim,' and I want to produce the photograph in court as I am sueing him for damages."

The Photographer: "Good idea. Now please—look pleasant!!" —*Fliegende Blätter.*

A WONDER

College President—You can't get into our college. You aren't qualified in the entrance requirements in Sanskrit, Greek or Calculus.

Prospective Student—No, but I am very well grounded in reading, writing, and arithmetic.

College President—Great Scott, man, you don't need a college education! Why don't you go into business?—*Puck.*

THE DIFFERENCE

A woman wearing a long hat-pin may be ejected from a street car in Berlin. Here the rest of the folks have to get out.—*Portland* (Me.) *Press.*

AN OUNCE OF PREVENTION

The Condemned Murderer: "Pardon, your Honor, won't you please have that knife sterilized before you behead me? I have always been dreadfully afraid of infection!!"

PLACING HER

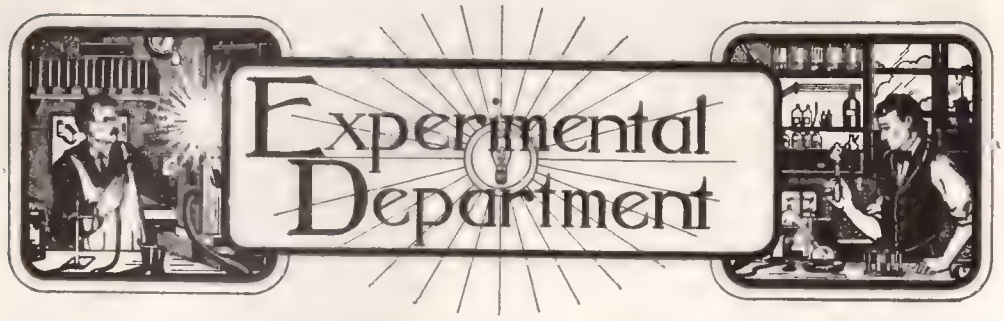
"How would you classify a telephone girl?" asked the old fogy. "Is hers a business or a profession?"

"Neither," replied the boob. "It is a calling."—*Washington Herald.*

THE WAY ITS DONE IN PARIS

"Now, what do you call that fool thing again?"

"You see its mighty handy in the winter to shake hands with your friends, and I keep my own hands nice and warm.—*Voilà.* *Pêle-Mêle.*



This department has been started with the idea to encourage the experimenter to bring out new ideas. Every reader is welcome to contribute to this department, and new ideas will be welcomed by the Editors. WHEN SENDING IN CONTRIBUTIONS IT IS NECESSARY THAT ONLY ONE SIDE OF THE SHEET IS USED. SKETCH MUST INVARIABLY BE ON A SEPARATE SHEET NOT IN THE TEXT. The description must be as short as possible. Good sketches are not required, as our art department will work out rough sketches submitted by contributors. IT IS THEREFORE NOT NECESSARY FOR CONTRIBUTORS TO SPEND MUCH TIME IN SKETCHING VARIOUS IDEAS. When sending contributions enclose return postage if manuscript is to be returned if not used. ALL CONTRIBUTIONS APPEARING IN THIS DEPARTMENT ARE PAID FOR ON PUBLICATION.

FIRST PRIZE TWO DOLLARS

A GOOD LOOSE COUPLER

List of materials:

1 Board 16 x 5¼" x ¾".

FIG. 1.

2 Boards 5¼" x 5¼" x ¾".
1 Board 5¼" x 4½".
2 Round plugs 3½" dia. x ½" thick.
30 Inches of 5/32 brass rod.
15 ¾"-¼" round brass rod.
7"-¼" square brass rod.
1"-½" brass angle.
5 E. I. Co., binding posts, No. B-8
3" No. 16 brass wire.
1 E. I. Co. ball bearing slider.
1 Piece of aluminum or brass bar ½" wide by 3½" long by ⅛" thick.
½ lb. of No. 22 Black enameled wire.
¼ lb. of No. 30 Black enameled wire.
1 Switch lever off an E. I. Co. battery switch.
1 Piece of pretty heavy spring brass ½" wide by 2" long.
1 Brass collar with set screw drilled to fit on a 5/32" brass rod.
4 Brass wood screws ¾" long.
1 E. I. Co. heavy brass washer.
1 Round wooden knob 2" diameter x ½" thick.
6 Battery bolts with nuts.

DIRECTIONS FOR ASSEMBLING

After the lumber has been cut to the proper size and finished and drilled ready to put together, proceed to wind the primary and secondary coils. The primary coil should be wound with the No. 22 gauge wire and both ends brought out to the binding posts on the coil heads. The secondary should be wound with the No. 30 wire, the winding being divided into six sections with five taps taken off between the sections. These five taps, together with the end of the winding farthest away from the primary coil should be connected, in order, to the six switch points on the right hand head of the secondary. The end nearest to the primary winding should be connected to the binding post back of the one which is attached to the spring which bears

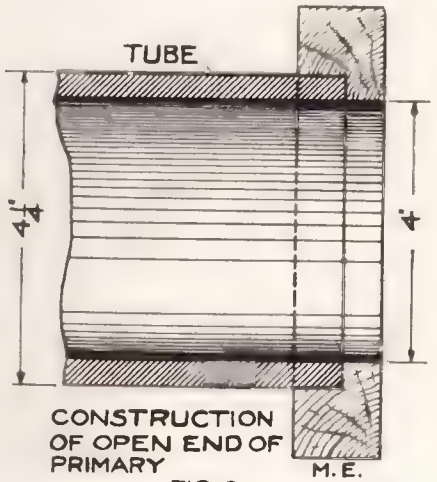
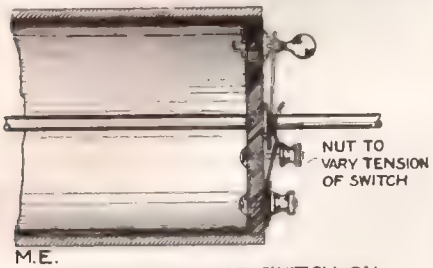


FIG. 2

on the switch lever on the right hand head of the secondary.

After the primary is wound slip it into the

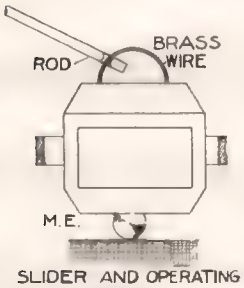
recesses in the two primary coil heads and mount on the base as shown, by means of brass screws coming up through the base.



CONSTRUCTION OF SWITCH ON SECONDARY
FIG. 3

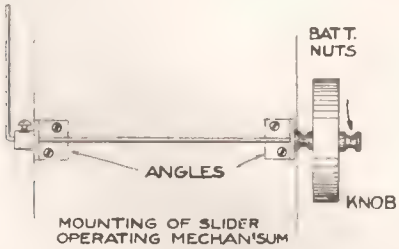
When the secondary has been wound and connected to the binding post and the switch points put on the switch lever together with the tension spring and binding post and the aluminum handle for moving the secondary back and forth and slip the piece of ¼" round brass through the hole in the center of the coil heads and insert the left hand end of the brass rod in a ¼-inch hole bored part way through the center of the left hand primary coil head.

Cut an 8-32 thread, 1¼ inch long, on one end of the 5/32 inch round brass rod, then run a battery nut or a hexagon nut and a washer on to this rod and slip the rod through the hole in the aluminum handle for moving the secondary coil, inserting the unthreaded end into a thick brass washer set in a recess in the right hand primary coil head. Then mount the right hand end standard to support the right hand ends of these two rods, and screw the nickel plated brass knob on the end of the 5/32 inch brass rod. Care should be taken that the 5/32 inch brass rod is parallel to the ¼ inch brass rod, for, if it is not, the secondary will jam when you move it.



SLIDER AND OPERATING ROD
FIG. 4

The binding posts on the secondary coil head should then be connected to the binding posts on the base by means of two conductor flexible cord.



MOUNTING OF SLIDER OPERATING MECHAN'SUM
FIG 5

All that now remains to complete the loose coupler is to put on the slider and the apparatus for moving same, which may be made up as shown in the illustration, or omitted en-

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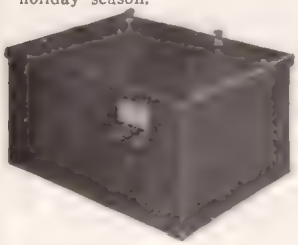

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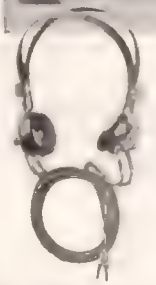

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tirely as the builder may desire. An extra binding post should be put on the left hand primary coil head and connected to the slider rod.

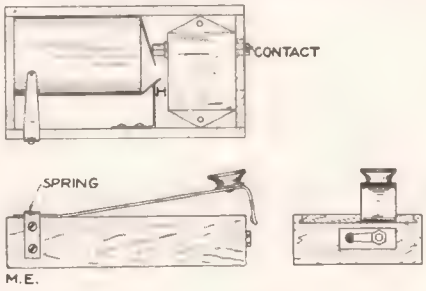
Contributed by

HOWARD DANNER.

SECOND PRIZE ONE DOLLAR POCKET BUZZER SET

The following instrument has a variety of uses, but was originally intended as a portable code practicer. It consists of four parts, a small wooden box with sliding cover such as small taps are packed in, a midget buzzer, battery and key. The battery is a "Merchlor" tungsten, as supplied for vest pocket flashlights.

Fig. 1 shows the general arrangement of the battery and buzzer. A slot cut through one end of the box allows a binding post of the buzzer to project and permit adjustment of the vibrator screw. One spring of the battery presses against the other binding nut on the buzzer while contact, H, connects the other



battery terminal to the spring finger, X. Both buzzer and battery are held in place by means of tightly wedged strips of felt or leather.

The spring finger makes contact with a key mounted on the box cover. This key, which is made of phosphor bronze spring, is of the shape shown in Fig. 2. By using a binding nut for a contact the apparatus is greatly simplified and by merely pulling back the cover a new battery may be inserted. When not in use a short length of rubber tubing slipped over the nut prevents accidental contact.

Although the finished instrument may be carried in a vest pocket it will transmit audible signals across a room and when placed near the ground wire forms an efficient detector test.

Contributed by

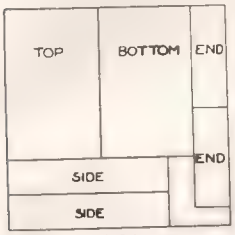
STUART R. WARD.

A SMALL ELECTRIC STOVE

The first thing to be considered in making an electric stove is the material, which is as follows: About one square foot of ¼" asbestos board, sheet, bar and rod brass, resistance wire, screws, bolts, etc., cord and plug.

First lay out the asbestos as shown in Fig. 1, and cut it with a hack saw and file to dimensions shown in Figs. 2, 3, 4 and 5. Bevel the ends of the four sides as shown. An old file is best to use as a new one will be dulled. Next lay out the holes and drill them. The

hole, A, Fig. 2, is to be drilled in only one piece. Make the legs of sheet brass or copper, about 18 or 20 gauge. Cut and drill as in Fig. 6, and bend at right angles on the center line. Assemble the four sides and legs, using 6-32 round head brass screws, 3/8" long, and



M.E. FIG.1

FIG.2

FIG-3

hexagon nuts. Put the screws in the lower holes only so that the heater can be slipped in.

For the heating element, any good non-oxidizing wire can be used such as nichrome, calorite, etc. For use on 110 volts take eleven pieces of 24 gauge nichrome wire 18" long and closely wind each one on a 1/8" dowel stick or heavy wire in order to make a coil. Slip off the coils and make a small eye on the ends of each. Place 4-36 round head brass

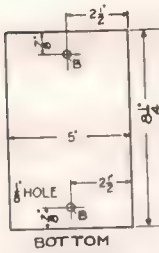
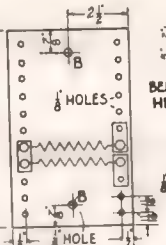


FIG. 5



M. E. FIG. 4

FIG. 6

FIG. 7

screws ½" in. long into the eyes thus formed, and screw on a hexagon nut. Put the coils in place on the top of the stove, slipping the screws into the holes. Now make ten connectors of sheet brass or copper, as in Fig. 7. Slip these over the screws under the top so that the coils will be connected in series. Then screw a nut over each screw to hold the connectors in place. This completes the heater. Place it in the body, so that it rests upon the nuts which hold the sides together. Thread a

M.E. FIG. 8

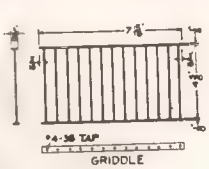


FIG. 9

piece of asbestos insulated heater cord through the hole, A, and connect it to the end of the last coil and the beginning of the first one. A small "Federal" porcelain bushing may be fitted in the hole, A, if desired. A rubber bushing should not be used as it would soften

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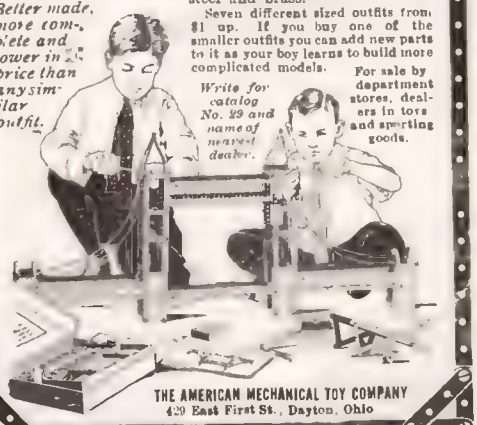

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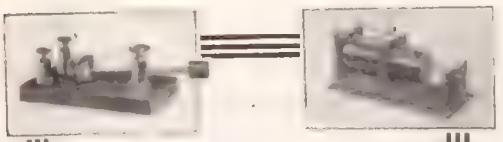

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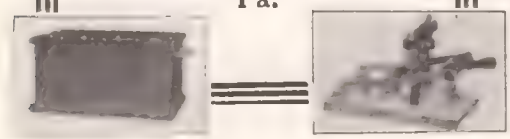

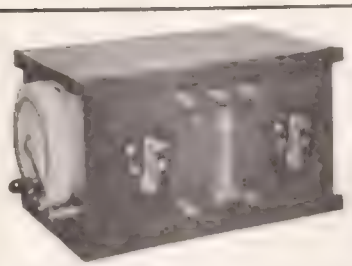

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or perhaps take fire from the heat of the stove. Also rubber insulated cord should not be used for the same reason and is forbidden by the Underwriters. Then put the bottom in place below the heater and fasten by two 4-36 round head brass screws one inch long, with nuts, through the holes, B. This assembling is shown in Fig. 9, which is a cross section. Now put screws and nuts through the upper holes in the legs and sides. These serve to hold the griddle.

Make the sides of the griddle from $\frac{1}{8} \times \frac{3}{8}$ brass bar with holes drilled and tapped in them as shown in Fig. 8. Get some 3/32" brass rod, and cut 12 pieces $4\frac{7}{8}$ inches long. Thread one end of the rods $\frac{1}{4}$ inch down and the other end $\frac{1}{8}$ inch down. Screw the $\frac{1}{4}$" threaded ends into one of the sides of the griddle all the way. Lay the other side opposite the ends threaded $\frac{1}{8}$ inch and proceed to screw them tightly into the second side, partially unscrewing them from the first. File off any projections and drop it into the stove, where it will rest on the nuts on the sides. See Figs. 8 and 9.

Cut off the flexible cord to the desired length and put on an attachment plug.

Cut a piece of sheet iron, brass or aluminum to fit the inside of the stove. For frying purposes the plate is used and for toasting the griddle is used.

This stove should be connected to a receptacle wired directly to the lighting circuit. It should never be connected to a lamp socket on a lighting fixture.

Contributed by

HAROLD WHITTLE.

AN ADJUSTABLE RESISTANCE TELEGRAPH INSTRUMENT

Two boys came to me one day, and asked my advice in regards to a telegraph line they had constructed. It would not work successfully, and on inquiring about the resistance of the instruments I found one was a 5-ohm and the other a 20-ohm instrument. It is a well-

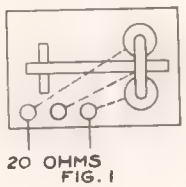


FIG. 1

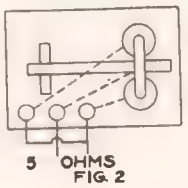


FIG. 2

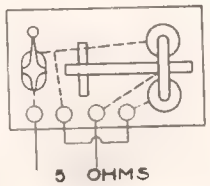


FIG. 3

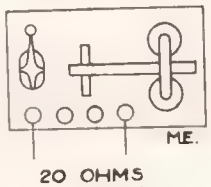


FIG. 4

known fact that magnets of different resistances will not work well together in series, so I set about to find a method of lowering the higher resistance, and, as it was not practicable to rewind the bobbins, here is how I did it.

Another binding post just like the others was secured and placed between them and all three were then connected as in Fig. 1. It is seen the middle connection of the coils, viz., where the two coils are connected together, goes to the middle post. That gives an instrument with three posts, the two outer ones connected to the outside of the winding and the middle to the middle of the winding.

To use it on a line requiring a 20-ohm instrument, the outside posts are connected to the circuit, Fig. 1. To use with a 5-ohm instrument, the outside posts are connected together, and one side of the circuit goes to both, while the other goes to the middle post, Fig. 2. This connection reduces the resistance to 5 ohms, for each spool is wound to 10 ohms, and when connected in series the resistance is equal to twice that of one, but when connected in parallel it is only one-half.

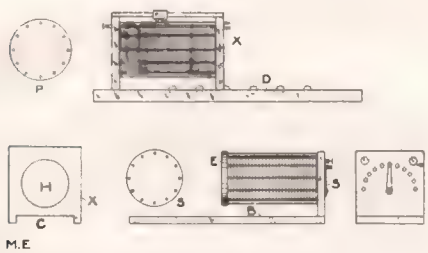
In case your instrument has the key on the same base, and you desire to change it, it will be necessary to mount two extra binding posts and then to connect the posts as shown in Fig. 3. Figs. 3 and 4 show how to connect for a five-ohm and a twenty-ohm set respectively.

Contributed by

HAROLD S. KESSLER.

AIR INSULATED LOOSE COUPLER

In place of using tubes to wind the wire on, threaded hard rubber rods are glued into holes drilled into the end pieces. The rods are ⅛" in diameter. The end piece, E, on the secondary is round to permit sliding through hole, H, in standard, X.



B, is an extra base on the secondary, which moves on rollers set in the base, D. S, are the rollers which may be had at any hardware store.

Space, c, in standard, X, permits base, B, to pass through.

Slider on primary should travel over one of the rods to make good contact.

Rods on secondary need not be threaded as there are no sliders, wire on secondary being covered and wound close.

In case the secondary needs repair, simply slide it out and use the primary as a tuning coil. The instrument does not have to be torn apart as do those having troublesome slides.

This instrument may look difficult to make, but try it and see how easy it really is. If preferred, guide rails may be put on base, D, to keep base, B, from going sideways.

Contributed by

FRANK X. KEILING.

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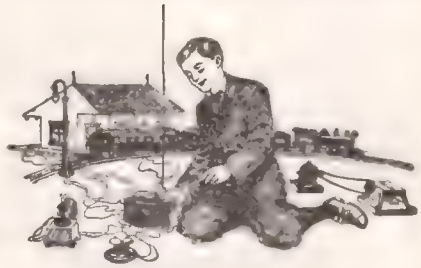

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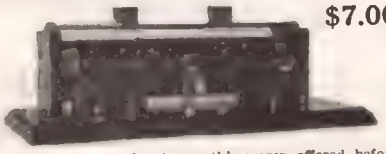

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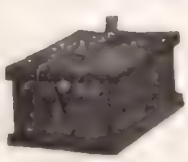

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A SIMPLE AERIAL MAST

The height is the first thing considered, and as this depends upon conditions, no specified height can be considered as being standard, but one hundred and twenty feet may be considered as being good in average localities.

The foundation is the next factor, and as no good construction rests upon a poor foundation, it should be perfect. Three cedar posts 4" x 4" x 6 feet placed 4 feet in the

FOUNDATION

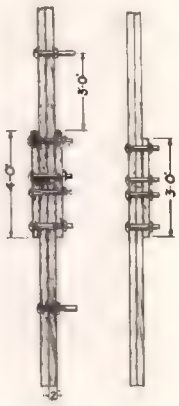


FIG. 1 FIG. 2

ground, side by side with the center post level with the surface of the earth will make a good foundation for this mast.

The mast proper is composed of 2" x 4" x 18 feet fir or pine, preferably dressed all around.

To erect, place a 9-foot length and an 18-foot length in the slot of the foundation and bolt to the foundation with ½" bolts.

Then holes should be bored in the two by fours at intervals of about 3 feet for ½" bolts and the bolts put in and screwed up tight. Or better, this should be done to all of them, on the ground, and a good coat of white lead and linseed oil will help preserve them very much. The bolts should be about six inches long, and the end left sticking out, to aid in climbing the mast.

In this manner, one may climb to the lap joint, fasten temporary guy wires (about every 16 feet near the top), and then slide another 4" x 4" x 18-foot pole up to the joint and bolt it together, then proceed as before.

I believe that 200 feet would be easy if one is careful and uses heavy guy wire, although my mast is but 126 feet high.

For permanent guys, No. 8 or No. 10 galvanized iron is advisable, about every 20 feet, and for best results, these should be broken into 20-foot lengths with porcelain knobs.

The total cost of my 126-foot pole was but $3.35, and it holds up an aerial composed of 4 No. 12 copper wires, 100 feet long with two 50-foot leads.

Contributed by

WILLARD HURLEY.

PORTABLE RECEIVING OUTFIT

First procure a piece of white wood 10" x 3½" x ¾". Beginning about ½" from one end wind No. 24 enameled wire around board for a space of 7". The rods are fastened by means of holes drilled near the ends, and slightly raised by a few washers. The sliders are of brass tubing, with a piece of spring brass soldered on the bottom so it touches the wire at the sides of the rod.

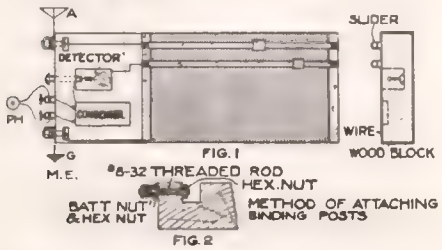
On the other 3" cut a one-inch square hole ½" deep and line the bottom with thin sheet copper.

Drill a hole through from the end of the board to the square hole. Line this with a copper tubing ⅛" and thread it. Procure a piece of threaded copper or brass rod to fit same, and on one end wind a small brass spring, bringing it to a point. On the other end screw a rubber knob. A small metal cover made to slide over the square hole will keep minerals in when not using.

The condenser is of tinfoil and mica, and is placed in a recess. Attach binding posts as shown in Fig. 2. Make connections as shown in Fig. 1. All wires should run in grooves.

The exposed wood work can be stained and polished so as to look good.

A cloth cover should be made to fit it and



provided with a sling to go over the shoulder so it may be carried under the coat.

Contributed by

HOWARD A. THOMPSON.

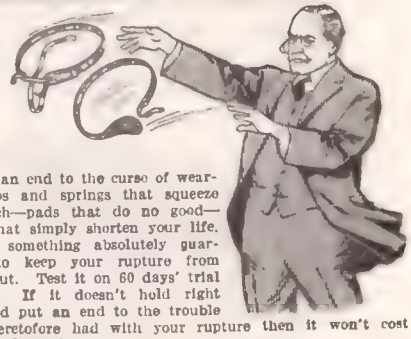
CONTACT FOR LOOSE COUPLER

While building a loose coupler of the style described in "How to Make Wireless Instruments," the idea of placing two springs on my secondary to make contact with the rods did not seem very good to me, so I bought two brass curtain rods, 3/16 inches diameter, of the kind that has a small tube sliding into a slightly larger one. I used the small tubes for the rods on which the secondary slides, and after cutting two pieces of the larger tube the length of my secondary, I soldered one end of the wire wound on the secondary to one large tube and the wire from the switch to the other tube. I then placed the tubes in holes bored one inch above and below the center of the end pieces of the secondary. I find that it is possible to obtain a better contact by this means than by the springs, because the whole weight of the secondary lies upon the brass tubes, and I also find that the secondary slides much easier this way.

Contributed by

T. E. JONES.

Away With Worthless Trusses



Here's an end to the curse of wearing straps and springs that squeeze and pinch—pads that do no good—trusses that simply shorten your life.

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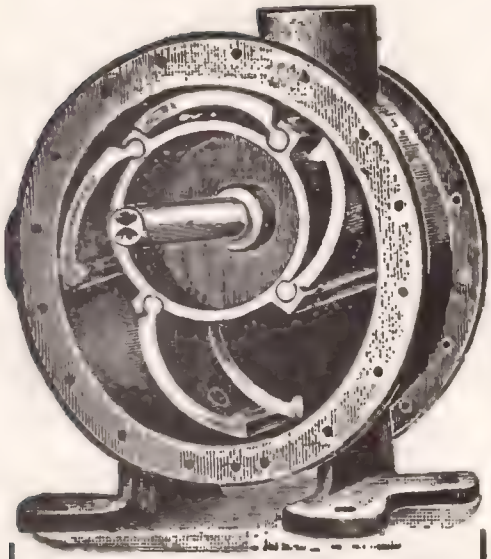

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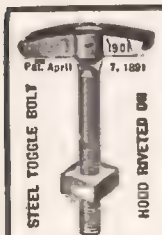

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AN EFFICIENT TUNING TRANSFORMER

I am going to describe the construction of a loose coupler I designed and made myself. I am sure every amateur who does not already possess one will make one when I say that since I have put mine in use I have been able to hear stations I could never hear before.

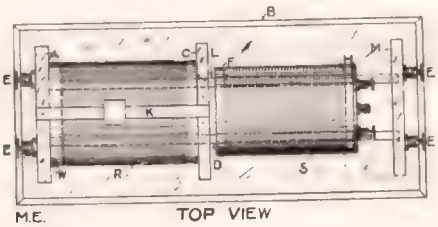
Use mahogany or oak for the wood work as this will give the neatest appearing instrument.

The base, B, is 13½" long, 6" wide, and one inch thick. It has a ⅛" bevel along the top edges.

The piece, A, is 5" square and ½" thick. It has two holes drilled in it to receive the binding posts, E. These are 2" up from the bottom and 1½" in from each side.

The piece, W, is 4" in diameter and ½" thick. It has two holes cut in it to receive the ¼" rods, D and L. The holes are cut ¾" in from the opposite edges. The piece, W, is now screwed onto A, so that the ¼" holes are each equi-distant from the base, and the center of W is over the center of A. Two more holes are drilled in W to correspond with those in A.

The piece, A, is now fastened to the base, by screws, so that it is ½" in from the end,



M.E. TOP VIEW

and ½" from each edge.

The piece, C, is 5" square and ½" thick. It has a hole cut in the center of it, 4⅛" in diameter. This is then fastened to the base 5½" from A and ½" from the sides of B.

The circular pieces, F and H, are each 3½" in diameter and ½" thick. They have two ¼" square holes in each, which are ½" in from the opposite sides. These should go through each piece, and are for the rods, D and L, to pass through.

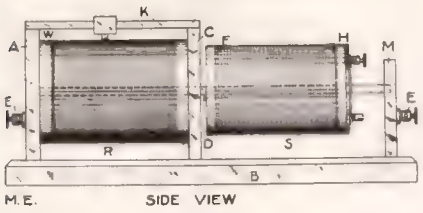
This completes piece F; but H has an eight-point switch on it, and two hard rubber binding posts on the upper part of the face, as in the drawing of the secondary connections.

The end piece, M, is 5" wide, 4½" high and ½" thick. It has two ¼" mortises cut halfway through it. These are 2½" up from the bottom and 1¼" in from each side. There are also two holes drilled two inches from the bottom and one and one-half inches from the edges. These are to receive the binding posts, E.

This piece is fastened to the base ½" in from the end and ½" in from each side.

A cardboard tube is now made by rolling a strip of cardboard 6" wide into a cylinder so the inside is 4" in diameter and the outside

4⅛" in diameter. This is the primary tube and should fit over W and into C. After having been given a good coat of shellac it is ready for the winding. This consists of one layer of No. 22 enameled wire. The winding is started ½" from the end, in which W is fastened, and continued to 1" from the op-



posite end when the wire is then brought through the tube and over to one of the binding posts on A.

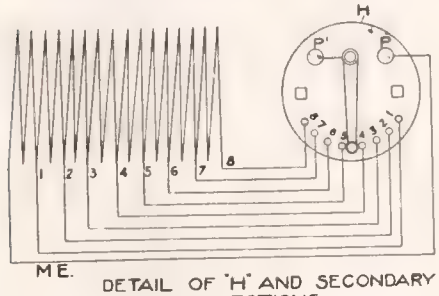
A slider rod is then placed over the middle of the tube and rests on the centers of the tops of A and C.

A slider is now placed on the rod and the enamel removed from the wire where the slider touches it by rubbing it with a pencil or ink eraser. The slider may be made, but I tnink it will be better to buy one. The other binding post on the end, A, is connected by a wire to the slider rod. This completes the primary.

The secondary tube is also made of cardboard and is 3½" in diameter and 5" long. It must fit tightly over the pieces, F and H.

No. 28 cotton covered wire is used to wind the secondary. The winding is one layer and wound in the same direction as the primary.

The winding is started ½" in from the end, F, and taps are taken off every half inch. It is wound to ½" from end, H. The end of the winding at F is connected with one of the binding posts, P, while the other post is connected with the switch handle. The taps which were taken off are connected to the points of the switch in the order they come, tap 1 being connected with point 1, etc. The piece, H, may now be fastened in the tube so that the holes which receive the quarter



DETAIL OF "H" AND SECONDARY CONNECTIONS

inch rods are opposite those of piece F. This completes the secondary.

Two aluminum rods ¼" square and 11¾" long are now run through the holes in the end pieces of the secondary. One end of each is placed in the holes in W, and the

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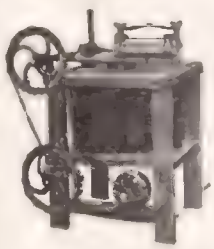

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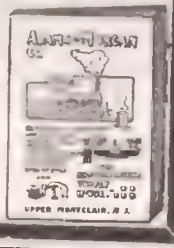

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others in the mortices in M. The secondary should now be able to slide in to and out of the primary.

A piece of twisted lamp cord is now obtained. This should be green silk covered and one foot long. It is untwisted and the end of one strand connected to the binding post, P^1, on the secondary. It is twisted loosely around the rod, D, about five times and the other end fastened to the binding post, E, on the inside of the end piece, M.

The other cord is connected the same way with P, and the other binding post on the end piece, M.

I think this way of connecting the secondary is better than by sliding contacts, because there is always a good connection while the secondary is being moved

The loose coupler is now finished, as far as working qualities go.

The woodwork will look best stained some dark oak finish, if oak, or if mahogany, stained the regular mahogany finish.

The ends of the primary and secondary, on which no wire is wound, will look well if a strip of black passe-partout binding is glued over the cardboard. The secondary wire, if now painted black with enamel, will look much better.

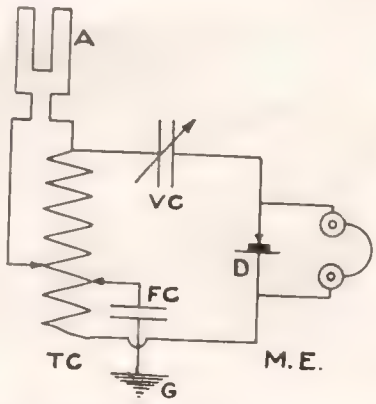
I am sure any one making this transformer will be well repaid for the time and labor spent on it.

Contributed by

WILLARD S. WILDER.

HOOK-UP FOR LONG WAVES

The receiving connection shown is one adapted for long waves and brings in long



distance stations. I use it to copy commercial and government stations. An amateur is seldom heard with this hook-up.

Contributed by

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SIMPLE BATTERY RHEOSTAT

Material required:

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2 Battery binding posts.
6" Flexible conducting cord.
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1 Wooden base, 3" x 4½" x ¼".

Mount the two screw eyes on the wooden

(*Continued on page* 1002.)

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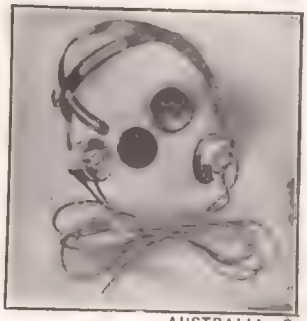

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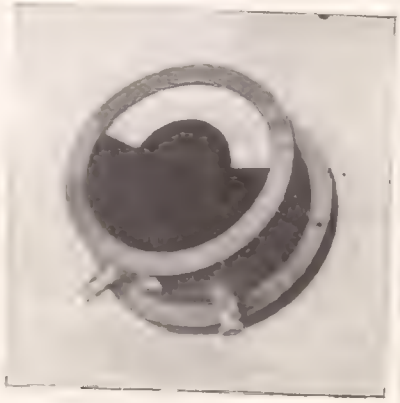

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Advice on Patents

AUTOMATIC SAFETY DEVICE

(80) Mr. Leonard Moran, of Brooklyn, N. Y., sends in a description of a device which is to automatically close, by electricity, the window of a room in which there is a fire, thus permitting people to descend the fire escape outside the window in safety. The invention also has for its purpose that when a window is fully closed it would open a switch in the motor circuit. Then if the window were raised by hand the switch would close and the motor would then close the window again automatically.

A. This idea, as far as itself goes, is ingenious, but that is about all. It would be a very expensive undertaking for any landlord to equip, say, 100 windows of a big house with such a device, which at best would not be of much use anyhow, as the glass itself, unless wire glass, would not stand much show against the onslaught of the flames.

BINDING POST

(81) Mr. W. L. Gray, of Maryville, Mo., sends in a design of a one piece binding post and would like to have our opinion in regard to its usefulness and patentability.

A. It is very hard to say from the drawing whether this design would not infringe on a well known spring binding post and unless a model is submitted we would not venture our opinion, as in some devices, while they look good on paper they work altogether different as soon as set up.

We think, however, that the idea has much merit.

SPARK PLUG PROTECTOR

(82) Mr. Harold Bibber, of Gloucester, Mass., sends in a design for a protector for spark plugs.

The casing is metallic, which alone is sufficient to make the idea without any value, as there is too much danger of the plug becoming short circuited. There are a number of spark plug protectors, sometimes also called spark plug hats, on the market now, and we do not think that any of them have any merit at all.

ANOTHER BINDING POST

(83) Mr. David Kuskin, of Bronx, N. Y., sends in a design of a spring binding post.

The idea as submitted is a very poor one, and as described by our correspondent is supposed to work on the wedge plan. The trouble with such designs is that the wedge usually becomes loose after a time and as a matter of fact such binding posts have been tried out without much success.

WIRELESS HOOK-UP

(84) Mr. C. Lueschen, of Buffalo, N. Y., sends in a description of a wireless system in which a triple pole switch does away with the anchor gap.

A. There is nothing new to this. As a matter of fact, very similar ideas have been published in *Modern Electrics* a number of

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REFERENCES

Lincoln National Bank.....Washington, D. C.
Little Giant Hay Press Co., Alma, Mich., and Dallas, Texas
Electro Importing Co.....New York, N. Y.
American Railway Appliance Co.....Oil City, Pa.
Farmers' Mfg. Co,.....Norfolk, Virginia
Griffin Mfg. Co.....New York, N. Y.
Warsaw Paper Box Co.....Warsaw, N. Y.
Butler Engineering Co.....Akron, Ohio
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Gray Lithograph Co.....New York, N. Y.

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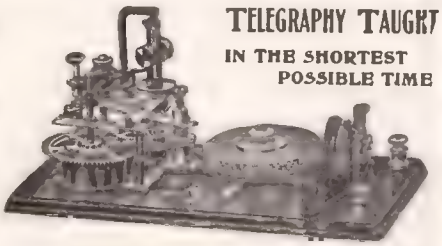

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times, while the Electro Importing Co. manufacture a triple pole switch which does practically the same thing as described by our correspondent.

PATENT No. 1,039,717

(Continued from page 930.)

self-induction per unit of resistance, I make the conductor out of a number of elements grouped together so as to take the general form of a flat strip, i. e., the width of the conductor is greater than its thickness. For instance, in Fig. 2, the width may be one-eighth of an inch, while the thickness is one-sixty-fourth, from which it will be seen that I here use small wire. These wires forming the individual elements are preferably coated with insulation such as enamel and the conductor itself should be made in spiral or woven form, so that within a certain length of the conductor every individual elemental wire will successively occupy every position around the circumference of a conductor. Such a conductor is then wound edgewise to form a coil, as indicated in Fig. 5.

In Fig. 1 the conductor is made by assembling the wires in the form of a hollow twisted tube and the tube is then flattened to have a sectional shape as indicated in Fig. 2. In Fig. 3, I show a form in which the wires are first braided in tubular form after the fashion of a tubular lamp wick and the braided tube is then flattened in the form of Fig. 4.

Of course the strip or conductor may be more than two wires thick and may have any number of layers of wire; and moreover each of the wires described may itself consist of a number of smaller wires laid together with a circular twist as indicated at 11, in Figs. 1 and 2. In such case these ultimate subdivisions are themselves preferably insulated as by enamel, and this latter construction I have found especially adapted in making large conductors, such as a conductor ¼ inch thick and two inches wide. Such a conductor may be made by first constructing the composite wire say of 500 elements insulated and laid together with a circular twist and then this conductor put together as indicated in the drawings. I find such construction gives better results than making the flat conductors out of a great number of layers.

By thus forming a large number of wires in the shape of a flat strip or conductor and then winding such flat conductor edgewise into a coil, I obtain a much larger inductance for a given resistance than has been made with any other form of conductor, and I thereby obtain higher efficiency in apparatus for generating and utilizing high frequency currents. This advantage is especially marked in dealing with electrical oscillations in wireless telegraphy."

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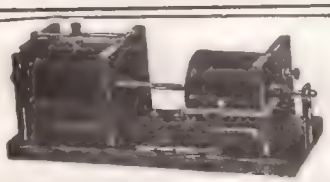

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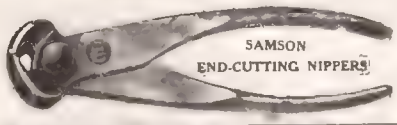

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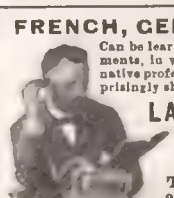

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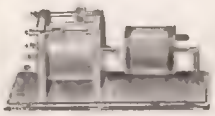

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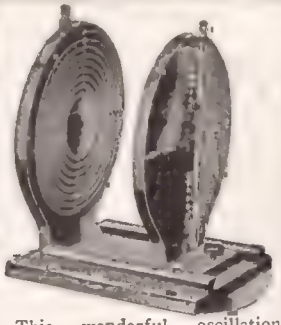

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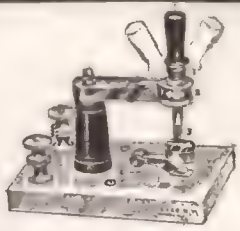

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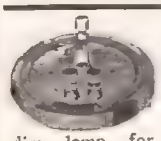

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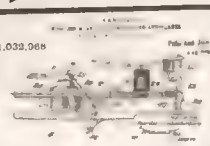

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1913 CATALOG

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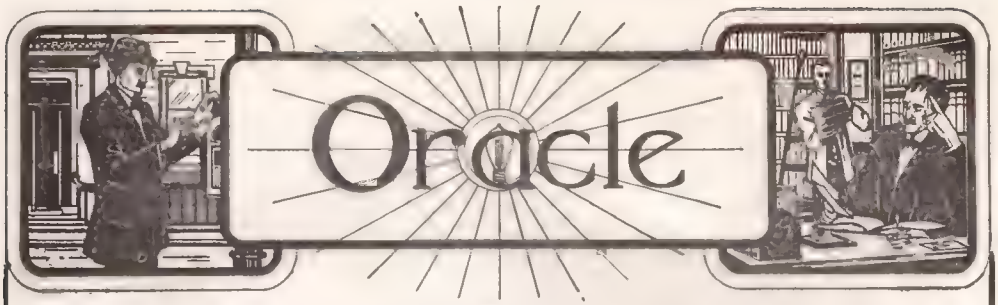


Queries and questions pertaining to the electrical arts, addressed to this department, will be published free of charge. Only answers to inquiries of general interest will be published here for the benefit of all readers.

On account of the large amount of inquiries received, it may not be possible to print all the answers in any one issue, as each has to take its turn. Correspondents should bear this in mind when writing.

Common questions will be answered by mail if 10 cents to cover expenses have been enclosed for each question. This class of correspondence has grown to such proportions that we can no longer answer questions by mail free of charge.

Owing to the additional labor required in the gradual advance of the date of publication of this magazine, there will be more or less delay necessary in answering questions and we therefore cannot undertake to furnish quick replies, for the next few months at least.

Special information requiring a large amount of calculation and labor cannot be furnished without remuneration. THE ORACLE has no fixed rate for such work, but will inform the correspondent promptly as to the charges involved.

NAME AND ADDRESS MUST ALWAYS BE GIVEN IN ALL LETTERS. WHEN WRITING ONLY ONE SIDE OF QUESTION SHEET MUST BE USED; DIAGRAMS AND DRAWINGS MUST INVARIABLY BE ON A SEPARATE SHEET. NOT MORE THAN THREE QUESTIONS MUST BE ASKED, NOR SHALL THE ORACLE ANSWER MORE THAN THIS NUMBER. NO ATTENTION PAID TO LETTERS NOT OBSERVING ABOVE RULES.

WE CANNOT ANSWER QUESTIONS REGARDING SENDING AND RECEIVING RANGES.

TWO COILS IN SERIES ON 110 V.

(2219.) I. Teitelbaum, New York, says:

Q. 1.—I have two E. I. Co. half kilowatt transformers, one with a vibrator and one without. Is it possible to connect the two coils in series and use them on 110 volts D. C., with batteries shunted across the line? How many batteries would I need?

A. 1.—The two coils may be connected in series and used in connection with an electrolytic interrupter on 110 volts D. C. We know of no scheme whereby you can use batteries shunted across the line. They are unnecessary anyhow.

Q. 2.—Would this comply with the new law, as I am within five miles of a government station?

A. 2.—We cannot say whether this would comply with the new law or not. If the coils take more than 4.55 amperes from the 110 volt lighting circuit, it would not comply with the law, as this would be more than ½ kw.

TWO RECEIVING SETS ON SAME AERIAL AT ONCE

(2220.) Luther Lachamber, New York, writes:

Q. 1.—I have just made two aerials out of one tremendous one and are situated 38 feet apart from each other. I have two DPDT switches and two lightning switches. What I want to know is this: Can I bring one aerial to the same set? Besides having a coupler, I have added a tuning coil. The coupler does from 2,000 to 2,500 metres. In other words, I want to have two sets in one. Do you think I ought to add another condenser, say one of C. I. Co.'s baby condensers?

A. 1.—We presume you mean that you wish to operate two receiving sets on different wave lengths from the same aerial at the same time. This can be done, but each set must be complete in itself; that is, each set must include a tuner, condensers, detector and 'phones.

Q. 2.—Will an A. C. motor run on D. C. and vice versa?

A. 2.—A. C. commutator motors, with the exception of the repulsion type, will run on either A. C. or D. C. D. C. motors will run on A. C., but they heat up and spark badly at the commutator. Induction motors will operate only on A. C.

Q. 3.—Will you kindly give me hook-up of the way they hook-up a wheatstone bridge or a buzzer down at the examination room, or whatever they use to produce that "click" in the receivers?

A. 3.—We do not understand your question. If you are referring to the circuit used for the code receiving test, would say that this simply consists of a small 110 volt to two volt D. C. dynamotor, and the receivers are connected directly to the brushes of the 2 volt end of the machine. The tone produced in the receivers is due to the variation in the voltage as the commutator segments slide under the brushes.

INDUCTION FROM TWO SETS OF POWER WIRES

(2221.) Harold Whittle, New York, writes:

Q. 1.—My house faces on two streets. There are power wires on both and an arc light on one of them. My aerial is per-

SENDING AND RECEIVING WIRELESS OUTFITS

COMPLETE — PORTABLE

IDEAL SETS AT A PRICE YOU CAN AFFORD TO PAY

Mounted on solid oak base, size 7 x 12

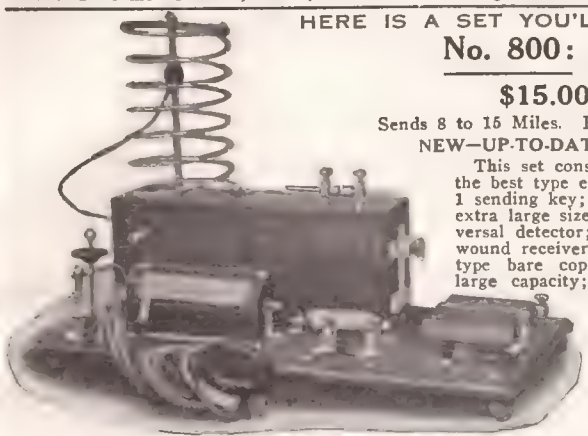
No. 796—$5 Value $3.90

Sends ½ to 1 Mile—Receives up to 500 Miles

This new, up-to-date, guaranteed, portable set, consisting of one ¼-inch spark coil, equal to the average ⅜-inch coil, and high tension vibrator, 1 combination universal detector; one 75-ohm, nickeled case, exceptionally sensitive telephone receiver and cord; 1 large high efficient flat plate secondary condenser; 1 sending key; 1 condenser switch; 1 spark gap with lathe turned ⅜-inch zinc spark ends; 1 tuner 4½ x 2 inches, latest type, wound with bare copper wire; 1 special primary condenser; 1-inch wollaston wire; 1 double throw double pole aerial switch; 120 feet aluminum aerial wire; 2 insulators, complete directions. The raw material alone would cost you this amount were you to build the set yourself. *Operates on two batteries*.....Price.....**$3.90**

No. 798—Same as above, with ½-inch coil. Sending radius 1 to 2 miles. Price.....**$5.00**

HERE IS A SET YOU'LL BE PROUD TO OWN



No. 800: $8.95

$15.00 Value

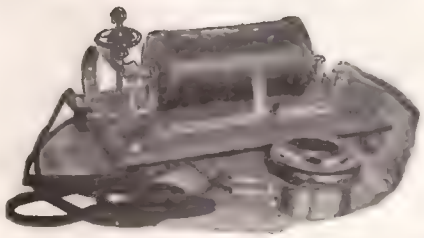
Sends 8 to 15 Miles. Receives 600 to 800 Miles

NEW—UP-TO-DATE—GUARANTEED

This set consists of a guaranteed 1-inch spark coil, the best type ever placed on the market for wireless; 1 sending key; special flat plate secondary condenser, extra large size; primary condenser; combination universal detector; very fine 1000 ohm, silk copper wire wound receiver and flexible receiver cord; the newest type bare copper wire wound tuner, exceptionally large capacity; spark gap with lathe turned 3.8-in. zinc ends; 1 condenser switch; 120 feet aluminum aerial wire; double pole; double throw switch; 2 insulators; 1-inch Wollaston wire; proper capacity sending helix; 8 to 15 miles sending. 600 to 800 miles receiving. Regular $15.00 Value. *Operates on 6 batteries.* Price complete.....**$8.95**

Mounted on solid oak base, size 8½ x 16 inches.
Equipped with 2,000 ohm Receivers and Headbands.....**$12.25**

For the Beginner



No. 797..... Mounted on Solid Oak Base .. $2.50 VALUE..... Receives up to 500 Miles **$1.95**

This consists of a combination universal detector; 75 ohm nickeled case, exceptionally sensitive receiver and telephone cord; tuner 4½ x 2-inch latest type, wound with bare copper wire; 1-inch Wollaston wire; 2 insulators; 65 feet aluminum aerial wire. **Price**.....**$1.95**

Equipped with two receivers, 150 ohm, headband and cord **$3.80**

Equipped with 1,000 ohm 'phone.....**$3.05**

By Mail 32c Extra

WIRELESS SPARK COILS

We give a greater value in spark coils than any other firm in America. Our coils are larger than other coils of the same quoted spark length as we put more working material inside of them. Our vibrator platinum points are PLATINUM AND WON'T STICK by welding together as alloy points are bound to do. We guarantee the spark lengths given below and you can have your money back if they don't come up to the values promised. These coils are put up in hard wood cases finished in an elastic varnish and then rubbed down to a dead finish making the handsomest coil on the market.

No. 200	¼	in.	coil	**$2.00**
No. 201a	⅜	"	"	**3.00**
No. 201b	½	"	"	**3.20**
No. 201c	¾	"	"	**3.65**
No. 202	1	"	"	**3.95**
No. 203	1½	"	"	**5.50**
No. 204	2	"	"	**7.75**
No. 205	3	"	"	**15.50**
No. 206	4	"	"	**25.00**
No. 207	6	"	"	**50.00**
No. 208	8	"	"	**75.00**
No. 209	10	"	"	**100.00**

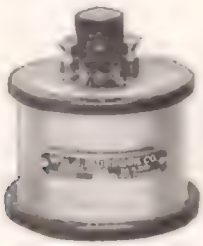
DON'T BUY BEFORE WRITING US. SEND AT ONCE FOR CIRCULAR M.

HUNT & McCREE

Laboratories 255 Washington St. | (The House of Wonderful Values) NEW YORK | **General Offices** 92-94 Murray St.

THREE DOLLARS

will put this rotary variable condenser into your station. Right for secon lary receiving circuits. Perfect in construction and in operation.

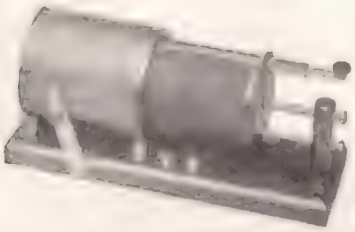


No. 364

Seven plates. Capacity .0005 mf., enough for effective tuning. Finely finished in hard rubber composition, with indicator and scale. No condenser on the market is a better value. Get one and see.

EIGHT DOLLARS

buys this splendid receiving transformer. Especially selective because of its excellent design. As effective as any other instrument on the market at double the price.



No. 343

Primary, bare copper wire, single slide. Secondary, silk covered copper wire, single slide, perfect mechanically. Both tubes hard rubber composition, absolutely unshrinkable. A big, balanced receiving transformer, built of the best materials, and capable of getting results equal to those obtained by any similar instrument within the price range.

Get one and see.

Wm. J. Murdock Co.

40 Carter St. Chelsea, Mass.

162 Minna St., San Francisco

When writing, please mention "Modern Electrics."

pendicular to the wires that feed the arc light, but the hum in the receivers is so loud that it is impossible for me to receive at night. Is there any remedy for this?

A. 1.—If you can swing your aerial around into such position that the induction from the power and arc light wires on the two streets neutralize each other, you will be able to get rid of the noise. If you cannot do this, there is no help for you. If your house has a flat roof, you might try the experiment of taking a single wire and grounding one end through your receiving set and have someone carry the other end of the wire so that it may be swung around into various positions with respect to the two sets of power wires; and if you find a position where the noise dies out, make note of it and erect your aerial so that it lies in the same direction as the experimental wire. This scheme can be tried out at small expense, and will save you the trouble of taking down your aerial and putting it up again several times before finding the proper position for it. If, on the other hand, you find after experimenting with the single wire that you cannot get rid of the noise, there will be no position in which you can place your aerial without hearing the humming noise in your receiving set.

Q. 2.—Can a type "S" dynamo be used in charging a 2 volt 20 A. H. storage battery, and how long would it take, turning the generator at 3,500 r.p.m.?

A. 2.—Yes. Eight to ten hours.

SENDING CONDENSER

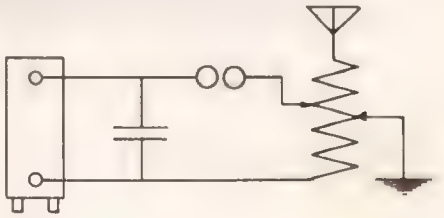
(2222.) Alfred Krumholz, Illinois, asks:

Q. 1.—What is the capacity of my sending condenser composed of 30 glass plates 1/10 inch thick with tinfoil 8 x 10 inches on both sides, plates being spaced ½ inch center to center?

A. 1.—0.0165 mfd.

Q. 2.—How must I connect the above condenser, a ½ kw. closed core transformer, and a helix composed of 11 turns of No. 6 wire wound on a cylinder 8½ inches in diameter, the turns being spaced 1 inch?

A. 2.—Use 17 of the plates for a condenser and connect the rest of the apparatus as per sketch herewith.



2222
M.E.

Q. 3.—How many turns of the helix must I use, so as to have a wave length of 200 or less? The distance from my spark gap to the end of the aerial being 100 feet, height of aerial 50 feet.

A. 3.—In the condenser circuit connect 1.6 turns of the helix. The number of turns to be included in the aerial circuit

NEW BIG 1913 CATALOGUE JUST OUT

Showing a complete line of **Electrical and Gas Supplies, Wireless Material, Novelties.**

Christmas Tree Outfits, Lionel Trains and Electrical Toys

Mailed upon receipt of ten cents in stamps, for which we will include with the Catalogue **20 Coupons** entitling you to our **Free "Wireless Course"** in **20 lessons** and **rebate memo covering 10cts. in stamps** which you may use as part payment with your first order of $1.

No 2. **Complete Electric Train Outfit,** consisting of Locomotive Tender, 2 trailers, and set of third rail tracks (2 straight and 4 curved). Will operate on 1 or 2 dry cells. Holiday price, complete by express $1.85
No. 3. **Same Outfit with Electric Headlight**.....2.35

No. 9. **Larger Locomotive** with headlight larger trailers, and 4 sections straight and 4 sections curved track. Price complete.....$3.90

Extra sections (1 foot) third rail track.. .....15c

CHRISTMAS TREE OUTFITS

One half regular price. Quality the best. 8 light battery outfit complete with 3 dry batteries..... **$2.35**

FOR 110 VOLT CIRCUIT

8 light.....$2.40 16 light.....$3.90 24 light.....$5.65

ASSORTED FRUIT

8 light.....$3.25 16 light.....$6.30 24 light.....$8,50

Extra lamps supplied with each eight lamps.

Western Agents for Electro Importing Co. on Wireless Goods. Same Catalogue. Same Prices

ANDERSON LIGHT & SPECIALTY CO., Chicago, Ill.

134-6 No. La Salle St. Dept. C Opposite City Hall

Holiday Suggestions:—

SPECIALS FOR DECEMBER ONLY

Wireless Spark Coils

½" each.....$2.75
1" " 4.00
1½" " 5.50
2" " 7.50
3" " 13.50

Platinum Points, Solid Oak Base

Heavy Wireless Key Solid Brass, $2.40.

Wireless Receivers

Single set, complete, 1,000 ohms $2.50
Double set, complete, 2000 ohms 5.00
Single head band..... .50
Double head band..... 1.00
Single receiver only..... 1.75

Porcelain Base Spark Gap, Nickel trimmings, each..$0.75

2-party Phones for lines up to 4,000 ft. Per pair $3.75

WIRELESS and ELECTRICAL CATALOGUE OF Hi-Grade Specialties

Showing every type of wireless instruments of merit on the market and many new ones at the same prices or better than you can get anywhere else. Send name and address and receive this new catalogue.

Detectors, $1.25 to $4.00

Complete wireless outfits, $1.75 and up.
Complete Line of Electrical Novelties for Xmas.
Free wireless course in 20 lessons. One Lesson with each purchase of $1.00.

JOHN Y. PARKE & COMPANY

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HIGHEST GRADES OF

MOULDED INSULATING COMPOSITIONS

Used on all Insulators, Bases for Detector Stands, Etc., Handles, Keys and Switch Bases, Buttons, Receivers for Head Bands, Bushings.

THE SIEMON HARD RUBBER CORP.

BRIDGEPORT
CONN.

SPECIAL HOLIDAY OFFER

You can get our regular $2.50
COMET SHAVING SET for $1.00
by sending us the attached coupon.

The vital part of any razor is the cutting edge. Through a new process of tempering and grinding, our blades are now so near perfection that it is impossible to conceive of a keener or more lasting cutting edge.

COMET SAFETY RAZOR CO.
258 Broadway, New York
Enclosed find $1.00 for which send me prepaid one Comet Shaving Set.
Name.....
Address.....
City.....State.....

The COMET SHAVING SET consists of Comet Safety Razor, Six guaranteed blades, Stropper for blades, Williams' shaving stick Shaving brush, each article heavily nickel plated.

When writing, please mention "Modern Electrics."

cannot be figured in advance, but must be found by experiment and they may be varied until the greatest amount of current is being sent into the aerial. This is best determined by means of a hot wire ammeter, or if you cannot get hold of one, it may be roughly estimated by observing the thickness of the spark in a small gap placed in the aerial lead.

RELAY WINDINGS

(2223.) J. M. Stanley, Jr., Maine, wants to know:

Q. 1.—Is it possible to make a step up transformer delivering fifteen to thirty volts direct current run by two or three new dry batteries?

A. 1.—No. A transformer will not work on direct current.

Q. 2.—What is better, a relay wound to a certain resistance with No. 26 or No. 30 wire?

A. 2.—This depends upon the winding space and the amount of current the relay is to carry. If the small wire will carry the necessary current, it is better to use it, as the number of ampere turns will be greater when the small size wire is used.

Q. 3.—Which is better on a one-half mile telegraph line, a 20 or a 150 ohm relay?

Q. 3.—The 20 ohm instrument will give better results.

HELIX. FLICKERING LIGHTS

(2224.) M. B. Brooks, Georgia, writes:

Q. 1.—Please advise me as to the best to use for helix, copper or aluminum wire, also a remedy for the flickering lights while using a ½ kw. transformer?

A. 1.—Copper wire is slightly better than aluminum wire, but will cost more. By running a separate pair of wires direct from the transformer to the meter. If this does not cure the flickering it will be necessary for the power company to install a separate power transformer to supply current for your wireless set.

SPARKS FROM FILM REWINDER

(2225.) Jos. Lesmeister, North Dakota, writes:

Q.—My rewinder is arranged on a small bench and is operated with the right hand. When a full reel is started and the left hand held on the face of the film while being rewound I have drawn sparks with my right hand up to two inches in length from the empty reel. The shock ordinarily is not very strong except on very dry and cold nights, when at times they are pretty severe. The theater was moved into new quarters sometime ago and a new booth erected. I have used the same rewinder in the new booth, but have been unable to obtain sparks as above described. The old booth was lined with asbestos and tinned sheet-iron, while this new booth is lined with a layer of asbestos board ½ inch in thickness. Also have obtained a new rewinder since, but there are no more sparks to be seen since I am in the new booth. The old rewinder was in no way electrically connected to the metal walls of the old

Packard

"WIRELESS" TRANSFORMERS

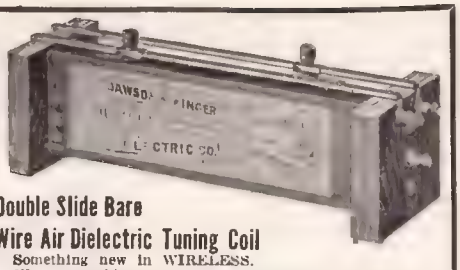
also

INSULATING CLOTH TAPES, VARNISHES and HIGH TENSION -:- -:- CABLE -:- -:-

For the boy who desires to make his own instruments.

All goods guaranteed

The Packard Electric Co.
349 Dana Ave., Warren, Ohio



Double Slide Bare Wire Air Dielectric Tuning Coil

Something new in WIRELESS.

We are making some very extravagant claims for our AIR DIELECTRIC TUNING COILS and there is a REASON. Our departure from the conventional cylindrical form of winding enables us to AIR SPACE the consecutive turns of the bare copper wire, with the result that moisture laden atmospheric dust cannot short the turns; a thing so common and so objectionable in other types of bare wire tuning coils. Each turn of wire touches the common supports (threaded rubber rod) at four points only and those conversant with the subject will appreciate what this means in the way of conservation of the little energy ordinarily available.

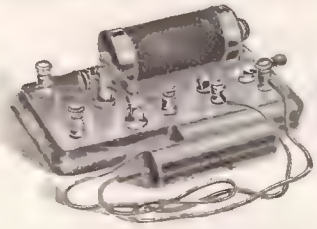
Through carelessness or inefficient receiving apparatus it is an easy matter for the listener to throw away what may practically represent one-fourth and even more of the initial energy of the sending station with which he may be endeavoring to get into touch. Such thoughtlessness reminds us of the story of "Darius Green and His Flying Machine." Darius, as you know, was so very confident in his ability to fly that the matter of a little extra weight was a "mere trifle," so in sheer braggadocio he donned an iron kettle for a hat and then made his ignominious plunge from the top of his father's barn.

We do not venture to infer that he could have flown had he not worn an iron kettle for a hat, but his humiliation would have been lessened somewhat had he not done so.

Carelessness regarding the insulation and selection of WIRELESS receiving apparatus is on par with the Iron Kettle episode of Darius.

Our NEW CATALOGUE "B" IS just out. Send stamp and you will receive copy by return mail. Is replete with things of interest to the experimenter in WIRELESS.

DAWSON & WINGER ELECTRIC CO.
727 South Dearborn St., Chicago, Ill.



DON'T FORGET—

We handle all kinds of ELECTRICAL TOYS and NOVELTIES as well as WIRELESS MATERIAL

Selling electrical toys is our business **every day in the year,** not just at the holiday season.

CATALOG No. 15 shows **Motors,** belt, hand and water driven **Dynamos, Medical Coils, Geissler Tubes, Sockets, Telegraph Instruments, Batteries, Bells, Wire, Etc.**

CATALOG "B"—**Our Unparalelled Electric Railway Material.**

CATALOG "A"—The Best There is in Wireless

Send 5c. stamps which will be refunded on first order.

SPECIAL QUOTATIONS ON TUNGSTEN LAMPS, FLASH LIGHTS
CHRISTMAS TREE LIGHTING OUTFITS

J. ELLIOTT SHAW CO., 632 Arch St., Philadelphia, Pa.

AGENTS SELL LIKE LIGHTNING

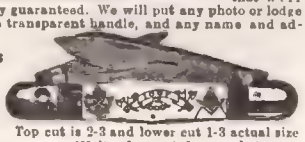
A sure money maker. Something new. Sell "Zanol" Concentrated Extracts for making Whiskies, Liquors and Cordials at home. **Saves over 90 per cent. of the liquor dealers' prices.** Makes the genuine article. A few minutes does the work. **Strictly legitimate. No license required.** Used by Liquor dealers for years. Sells in either wet or dry territory. Sam Miller sold over 3,000 packages. Others making $6, $12, $25, $50 a week. You can do it. A big repeater. Small, compact, carry week's supply in pocket. Sample case and agents outfit free. Enormous demand. Quick sales. Large profits. Better be quick. Territory going fast. Just send a postal. We will show you an eye opener.

UNIVERSAL IMPORT COMPANY
3933 Sycamore Street Cincinnati, O.

FOR HIS X-MAS GIFT

A REAL KNIFE FOR A REAL MAN

Not the ordinary gift knife, but a genuine hand forged English razor steel knife that will cut and hold its edge—fully guaranteed. We will put any photo or lodge emblem on one side of the transparent handle, and any name and address on the other.



SPECIAL X-MAS OFFER:
No. 25 Carpenter Knife $1.60
No. 4 Governor's Knife $1.85
Get Your Order in NOW. Top cut is 2-3 and lower cut 1-3 actual size
Agents wanted everywhere. Write for catalog and terms.
GOLDEN RULE CUTLERY CO., 554 W. Lake Street, Dept. 34, CHICAGO

SKULL RING.
ONLY FIFTEEN CENTS.
We have here a handsome up to date ring for sporting men. It represents a skull and cross bones. Will scare the timid. Sample by mail Fifteen Cents.
stones in eyes
oxidized silver finish
ACME R HOUSE, 409 Chestnut St., Milwaukee, Wis

LIGHT AS DAY

A BETTER LIGHT from any kerosene (coal oil) lamp or lantern than from electric or gas. Our WHITE FLAME SMOKELESS BURNER scientifically GASIFIES the oil, CONSUMES the carbon and develops a brilliant, white, 52 candle power light. NEVER SMOKES. Safe and reliable. NO MANTLE TO BREAK. Satisfies every user. **AGENTS WANTED** Earn $6.00 to $20.00 daily. This good light in demand everywhere. Sells on sight. Sample, postpaid, 35 cents, stamps or coin, 3 for $1.00. MONEY BACK IF NOT AS REPRESENTED.
"G-C" LIGHT CO., 50 Baldwin Block, - - INDIANAPOLIS, IND

To Entertain 311 Jokes and Riddles, 73 Toasts, 91 Parlor Amusements, 21 Puzzles, 15 Tricks with Cards, 7 Comic Recitations, 3 Monologues, 12 Funny Readings, 8 Fortune Secrets, 52 Money Making Secrets. All 10c postpaid.
J. C. DORN, 709 So. Dearborn St., Dept. 37, Chicago, Ill.

New Rupture Cure

Don't Wear A Truss.

Brooks' Appliance. New discovery. Wonderful. No obnoxious springs or pads. Automatic Air Cushions. **Binds and Draws the broken parts together as you would a broken limb.** No salves. No lymphol. No lies. Durable, cheap. Sent on trial. Pat. Sept. 10, '01.

CATALOGUE FREE
C. E. BROOKS
71A State Street, Marshall, Mich.

When writing, please mention "Modern Electrics."

booth, and is still mounted on its old bench made of 1½ inch pine, in the new booth.

A.—Even though the rewinder was in no way electrically connected to the metal walls of the booth, it is possible that a nail or screw passing into the wall of the booth was within sparking distance of some metal part or even a screw on the right hand reel holder, in which event the sparks, if jumping from your hand, would jump across this additional gap to ground. This short spark you would not, of course, see, if it happened to be on the under side of the bench on which the rewinder was mounted. The spark may even take place inside the wood of the shelf if, for instance, one of the screws holding the right hand reel holder happened to be close enough to one of the screws which fastened the shelf on to a metal bracket screwed to the wall; in fact, there are a number of ways by which the spark may leap to ground, although the foregoing will probably illustrate the idea.

ONE INCH COIL ON A. C.

(2226.) Fred A. Brandes, California, asks:

Q. 1.—How many volts and amperes does a one inch coil require?

A. 1.—6 volts, 5 to 10 amperes.

Q. 2.—Where may I get a suitable motor-generator set (to run on 110 A. C.) to operate above coil?

A. 2.—If you have A. C. it is unnecessary to buy a motor generator set. You might better buy or even make a 50 watt step down transformer such as is described in the September issue of *Modern Electrics*. Then connect the primary of the spark coil directly to the secondary of the transformer and screw down the vibrator so that it cannot operate. You will then secure a spark from the secondary terminal. Although this spark may not be as long as it was when used on batteries, however, the spark will probably be a good deal heavier and more suitable for use as a wireless transmitter, for which purpose we presume you want to use it. If you don't care to buy or take the trouble to make a step down transformer you can probably purchase for a few dollars an electrolytic interrupter which may be connected in series with the primary of the coil and the two connected directly to the 110 volt circuit. The vibrator of the coil should be screwed down tight in this case also.

Q. 3.—How can I charge dry cells with 110 A. C.?

A. 3.—You cannot.

THE AMATEUR AND THE WIRELESS LAW

(2227.) Joseph Hinkamp, Illinois, would like to know:

O. 1.—How long may my aerial for transmitting be so as not to disobey the law, limiting the wave length to 200 meters?

A. 1.—This is covered by an article begun in this issue of the magazine.

Q. 2.—Is it true that I will be prohibited from having a wireless station if it is not

THE JUDD Can't Wear Out the Clothes

—Because It's Perfectly Smooth Inside

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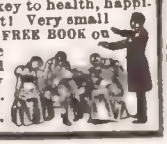

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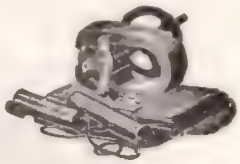

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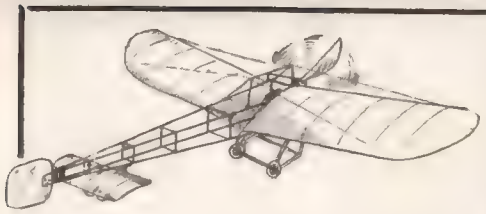

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put up before the new wireless bill goes into effect?

A. 2.—No.

Q. 3.—Can the platinum wire of an electric light bulb be used instead of the wollaston wire in an electrolytic detector, with as good results?

A. 3.—No. The wire from an incandescent lamp is entirely too coarse for use instead of wollaston wire in an electrolytic detector.

PIPE MAST

(2228.) Theodore H. Cowee, New York, inquires:

Q. 1.—Which one of these poles would be the best? Fifteen feet of three inch pipe, fifteen feet of two and one-half inch pipe, fifteen feet of two inch pipe; fifteen feet of three inch pipe, fifteen feet of two inch pipe, fifteen feet of one inch pipe; fifteen feet of two and one-half inch pipe, fifteen feet of two inch pipe, fifteen feet of one and one-half inch pipe?

A. 1.—The mast composed of fifteen feet of two and one-half inch pipe, fifteen feet two inch pipe, and fifteen feet one and one-half inch pipe would be best.

Q. 2.—Give simple way of insulating them from each other in their couplings. Will any of them be top heavy?

A. 2.—Standard insulating joints should be used between the sections. There is no other method that we know of for simply insulating them. None of them will be top heavy if properly guyed.

Q. 3.—Will it be all right to use a radiator ground for operating if I have a lightning ground outside the building and have a 250 ampere SPDT switch outside my window to ground my aerial?

A. 3.—The radiator ground will give satisfactory service and there is no objection to using it simply as an operating ground, the lightning ground being entirely separate and outside the building.

DYNAMO FOR RUNNING SPARK COIL

(2229.) Robert Tucker, Maine, writes:

Q. 1.—I am stuck in my study of wireless. Finding that batteries cost too much to run my 1½ inch coil, I am thinking of buying a dynamo which is run by a water wheel attachment, the one the J. J. Duck Co. put out. It is shunt wound. At a pressure of 90 lbs. its output is 25 volts and 3½ amperes. Would it be necessary to run it at that pressure to operate my coil for 18 miles. Here is the output: 40 lb. pressure, 15 volts 2 ampere; 50 lbs pressure, 18 volts 2½ ampere. 70 lb. pressure, 20 volts 3 ampere; 90 lb. pressure, 25 volts 3½ ampere.

A. 1.—The only satisfactory method of operating a spark coil from a dynamo is to use a dynamo and two 6 volt 40 ampere hour storage batteries in parallel and connect it to the coil as per sketch herewith. The dynamo may be run on any pressure from 40 lbs. up, and should be left running all the time you have the sending apparatus in use. The storage battery is necessary for the reason that the dynamo cannot fur-

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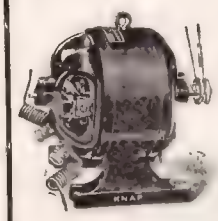

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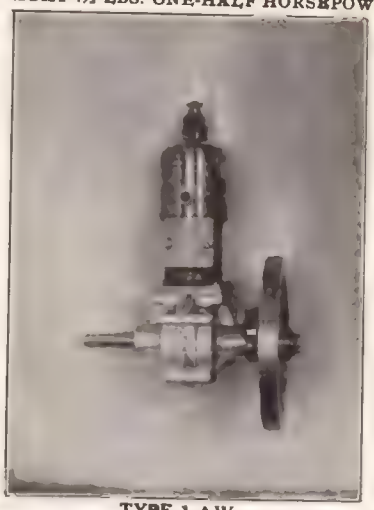

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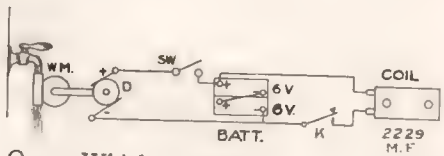
nish current enough to supply the coil, but when using a storage battery the coil takes all of the current the dynamo can furnish and draws the balance from the battery, the battery being recharged from the dynamo when the sending key is open. This arrangement is usually termed a floating battery.



Q. 2.—Which is the best for wireless use, series, compound, or shunt wound?

A. 2.—It is best to use the shunt wound dynamo in connection with the battery as above.

SMALL DYNAMO

(2230.) Samuel J. Siegel, Jr., New York, asks:

Q. 1.—Will a small dynamo generate more current when wound with thinner wire or coarser?

A. 1.—When the coarser wire is used the dynamo generates a large amount of current at low voltage. When the fine wire is used the voltage is higher and the current correspondingly less.

Q. 2.—Is there a way of rectifying A. C. of a small dynamo 8 volt 5 amperes to D. C. for charging storage battery cells?

A. 2.—Yes. Use an electrolytic rectifier as shown in answer to No. 2173 in the Oracle of the October issue and also the article on Simple Experiments in Alternating Currents in the October issue of *Modern Electrics.*

MICROPHONE AMPLIFIER

(2231.) J. Edward Pugsley, New Jersey, would like to know:

Q. 1.—What is the size wire to use for the magnets for use in the microphone amplifier described in the November issue and what number of ohms should they be to work best?

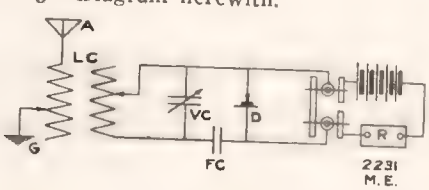
A. 1.—Use single silk insulated copper wire 2 mils (0.002 inch) diameter and wind each coil to 1,000 ohms.

Q. 2.—What is the space that is between the magnets and needles and does the magnet draw the needles down onto them when in working order?

A. 2.—Adjust the distance between the magnets and the needles so that the needles cannot be pulled down so they stick to the magnets.

Q. 3.—Also kindly give me diagram showing how to connect the batteries and relay to it?

A. 3.—Diagram herewith.



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QUENCHED SPARK. HOT WIRE AMMETER

(2232.) Clarence F. H. Nordman, New York, says:

Q. 1.—What is the principle of the quenched arc or spark? I tried the one shown in the October issue, but only got a hum in the transformer. Should I get a hum or a sharp noise?

A. 1.—See article on the quenched spark in the February issue of *Modern Electrics.* When using the quenched spark gap, the hum in the transformer is noticeable as the gap itself makes little or no noise. Of course, when an ordinary gap is used, it makes so much noise that the hum in the transformer is not noticed. Six or eight gaps of the type shown in the October number should be used in series on an ordinary wireless transformer.

Q. 2.—Will this quenched spark increase the sending radius of a ¼ kw. set?

A. 2.—It ought to, if the rest of the apparatus is properly connected and tuned up.

Q. 3.—I also tried to make the hot wire meter described in the October issue, but the hand does not move. Could you tell me what is the matter with this? I had it made as described.

A. 3.—In all probability the distance from the pivot to the point where the thread was attached is too long or it may be that your set did not furnish current enough to show any indication on the meter. However, if you will shorten the distance between the pivot and the point of attachment of the thread, you will probably find the meter will indicate.

PASSAGE OF HEAT THROUGH VACUUM. ISOLATED CHARGE ON A CONDUCTOR

(2233.) George Garrison, New Jersey, writes:

Q. 1.—The "Thermos Bottle," I believe, works on the vacuum theory—that is, it is composed of two bottles—a smaller one within a larger one, with the air between the two exhausted. This theory presupposes that air acts as medium through which heat travels, and also, as in the case of the Thermos bottle, that when the air is exhausted from a container, the remaining vacuum acts as a resistance and heat cannot pass through so readily. We know very little about our atmosphere or its depth, but we believe that it extends somewhere in the neighborhood of about 5 miles above our earth's surface. Still less do we know about the sun, but we believe that she has no atmosphere. There must, therefore, be an immense space between our atmosphere and the sun's surface that is entirely void of air. If air, then, acts as a conducting medium for heat, how does the heat from the sun ever reach the earth?

A. 1.—Your understanding of the construction of the Thermos and other bottles of the same type is correct. The vacuum is a poor conductor of heat, but radiant heat passes through it quite freely. This latter point can be readily demonstrated. Take the case of an ordinary incandescent lamp, the filament of

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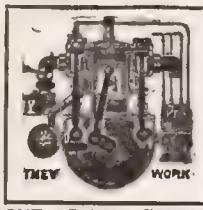

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which is surrounded by a vacuum inside the glass bulb. If the lamp has been burning for a little time the glass bulb will be found very hot. This is not due to the fact that the heat is conducted to the glass through the vacuum, but is radiated by the incandescent filament. It is the same way with the heat from the sun, which is radiant heat and readily passes through the space beyond our atmosphere, and reaches the earth despite the fact that beyond the atmosphere there is in all probability an absolute vacuum, or as near to it as possible.

Q. 2.—Also please explain why a perfect vacuum cannot be obtained?

A. 2.—This is purely a mechanical difficulty in that we have not yet developed apparatus sufficiently perfect to remove the last particle of gas from a vessel. This depends upon the fact that a vacuum pump at each stroke can only remove a portion of the air or gas in a vessel. This is analogous to the case of the dog chasing the rabbit and at each jump gaining half the distance remaining between him and the rabbit. It is, of course, evident that, theoretically, he will never reach the rabbit, and so it is with the vacuum. The pump never will exhaust the last particle of gas from the vessel.

Q. 3.—What becomes of the residue current left in an electric conductor after the circuit has been opened? To express the question more fully:—suppose there were a wire, having no resistance, stretched from the earth to the sun. We know that light and electricity travel at a speed of about 186,000 miles per second and that consequently a current of electricity would require about eight and one-quarter minutes to reach the earth, if it was started from the sun through a wire without resistance:—the distance between the two being 93,000,000 miles. Now suppose that in four and one-eighth minutes after we started the current through the wire, from the earth to the sun, we cut the wire—or broke the connections at both ends,—what would become of the current that was in the wire and that had traveled halfway through?

A. 3.—This is a rather hard question to answer, but we presume the current would remain on the wire in the form of a static charge, which would gradually be dissipated into the surrounding space.

KICK BACK PREVENTER. TRANSFORMER OIL

(2234.) H. J. Trueblood, Illinois, writes:

Q. 1.—I have two 2 MF and one 7 MF, telephone condensers. Could I use the former satisfactorily as a kick back preventer in conjunction with a ½ KW. transformer or the latter singly? If not, how could I use them?

A. 1.—Use the 2 MF condensers connected in series across the 110 volt circuit close up to the terminals of the transformer, then ground the connection between the two condensers.

Q. 2.—I have a helix wound with eight turns of No. 6 aluminum wire on a frame 12 inches in diameter, the turns being spaced one inch apart. Is this large enough for a ¼ or ½ KW. transformer?

A. 2.—Yes.

Q. 3.—Is the transformer oil being put out

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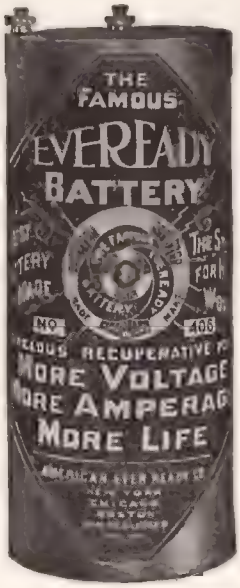

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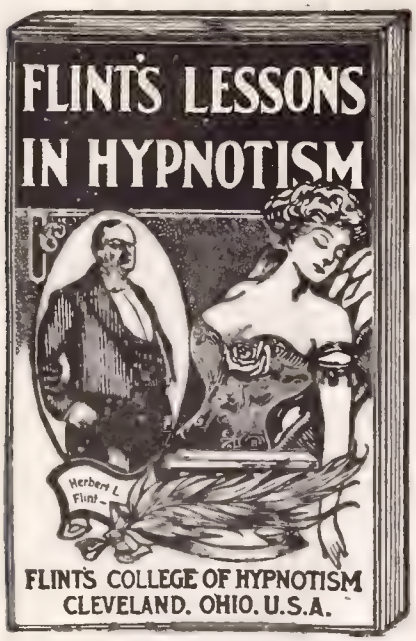

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by the Standard Oil Co., at about fifteen or twenty cents per gallon all right to immerse a transformer and condenser in?

A. 3.—Yes.

TUNING COIL

(2235.) Donald E. Mitchell, Illinois, inquires:

Q.—Could you give me a diagram of a tuning coil in your next issue of *Modern Electrics?* I have about 100 feet of No. 10 enamel wire.

A.—Wind your wire closely on a wooden roller 3 inches in diameter, then mount two or three sliders and rods after the manner shown on page 724 of the October issue of *Modern Electrics.* You have not enough wire to make a good tuning coil, also it is rather coarse. The usual practice is to wind 200 or 300 feet of No. 20 to No. 24 wire on the core.

TWO SPARK COILS IN SERIES

(2236.) S. Sledge, Australia, asks:

Q.—Could a ¾ inch coil and a 1 inch coil be connected up so as to give a 1¾ inch spark?

A.—Yes. Connect the primaries in series and the secondaries in series, then screw down one of the vibrators so it cannot work and see that the secondary coils are so connected that they do not buck each other. The combined spark length may or may not be 1¾ inches.

SPARK COIL ON 110 VOLT A. C.

(2237.) Karl E. M. Soderstroms, Michigan, wants to know:

Q. 1.—Can we use 110 volt A. C. for a one inch coil? If to connect lights in series with the coil, how many? Could we work the vibrator on the coil that way?

A. 1.—Connect ten 16 c.p. lamps in parallel and then connect the whole group in series with the primary of your coil and the lighting circuit. No. Screw it down so it cannot vibrate.

Q. 2.—In a wireless handy book issued by Cole Co. Morgan is a number of stations listed for 700 KW. As we never heard of any 700 KW. stations before we could hardly believe it to be correct. What do you know about this?

A. 2.—Probably this is a typographical error. There are no 700 KW. stations so far as we know.

Q. 3.—There is about nine amperes to one KW. at 110 volts, and 700 KW. would make 6,300 amperes. Would it not be rather hot?

A. 3.—Yes. This would be pretty hot stuff.

STATIC MACHINE

(2238.) Floyd L. Gurnee, Michigan, writes:

Q.—Seeing an article in *Modern Electrics* that Wimhurst static machines could be made of Columbia disc records, would like to have you publish in your oracle directions for making such a machine, also I wish to know where there is a school nearby for teaching wireless engineering complete?

A.—See page 107 of the May, 1911, issue of *Modern Electrics.* Consult our advertising columns for wireless schools.

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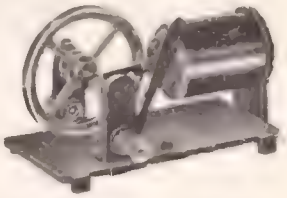

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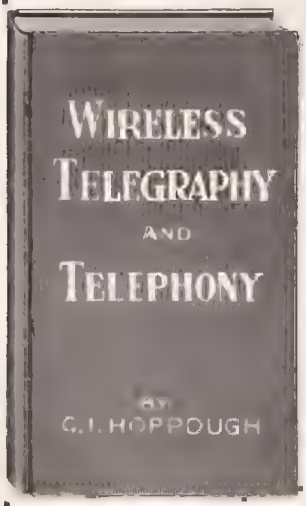

It embraces the following subjects Matter, Motion and the Ether; Electricity and Magnetism; Quantitative Electricity; Dynamo Electric Machinery; Electro Magnet Induction; Capacity and the Oscillatory Discharge of Condensers; Electro Magnetic Waves; Early Experiments in Wireless Telegraphy; Detectors; Receiving Circuit and Tuning Apparatus; Transmitters; Spark Gaps; Aerials; Wireless Equipment and Telegraph Stations; Wireless Telephony; Wireless Operating.

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CONDENSER FORMULA. OPEN VS. CLOSED CORE TRANSFORMERS

(2239.) Wray Miller, Ohio, asks:

Q. 1.—Please tell me how to find what size to make tinfoil strips and the number of same, when the MF is given in connection with condensers.

A. 1.—The total area in square inches of the dielectric material between tinfoil sheets equals

$$\frac{C \times t \times 10{,}000{,}000}{2248\ K}$$

Where: C equals the capacity in mfd; t is the thickness of the dielectric sheets in inches; K is a constant, the value of which depends upon the material used for the dielectric. K is about equal to 3 for ordinary glass and from 2½ to 3½ for paraffined paper. The size of the sheets makes no difference.

Q. 2.—Will home-made instruments, made properly, of a different design work equally as well as the ones named on the Supplement of the September issue of *Modern Electrics* in connection with the diagram given in same supplement?

A. 2.—They should operate satisfactorily, though perhaps not quite so good.

Q. 3.—Please tell me which is the best for wireless work. Open or closed core transformers?

A. 3.—The best transformer on the market to-day is of the closed core magnetic leakage type.

LIGHTNING GROUND SWITCH AND GROUND WIRE

(2240.) Ray Green, New York, wants to know:

Q. 1.—Will knives one foot long and one inch wide and one-sixteenth of an inch thick assembled together be all right for an outside ground switch? They are made of brass. How many amperes?

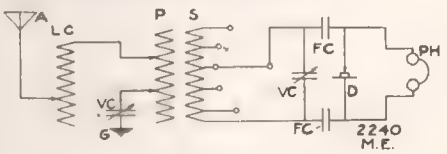
A. 1.—This should be all right. 150.

Q. 2.—Would ten strands of No. 20, five of No. 24 and five of No. 14 annunciator wire be all right for an outside ground wire, if twisted together? What number would it be equal to?

A. 2.—No. This cable would not be quite equal to No. 5 B & S and is therefore too small.

Q. 3.—Kindly give me the best hook-up for long distance work? One slide loading coil, loose coupler, double slide on the primary, 5 point switch on secondary, two variable condensers, two fixed condensers, Brandes superior receivers and a perikon detector?

A. 3.—Hook-up herewith.



UNDERWRITERS' RULES

(2241.) Philip A. Wachtell, Indiana, asks:

Q. 1.—Please give me diagram for most efficient way of connecting a six wire aerial?

A. 1.—See diagram C in answer to No. 1985 in the May issue of *Modern Electrics.*

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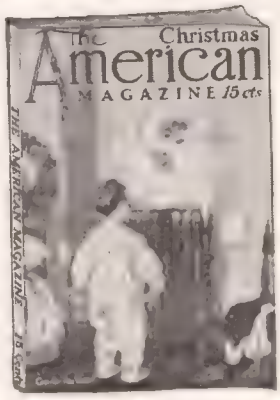

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Q. 2.—Where can I get a Marconi Wireless Key?

A. 2.—The Marconi Wireless Telegraph Co., 29 Cliff Street, New York, N. Y.

Q. 3.—Where can I get the rules and regulations of the Fire Underwriters?

A. 3.—The National Board of Fire Underwriters, 135 William Street, New York, N. Y.

POLARITY OF MAGNET

(2242.) W. E. Bryne, Massachusetts, wants to know:

Q. 1.—How can you tell the North and South Poles of a magnet by the filings, being placed upon a sheet of paper over the poles of the magnet?

A. 1.—You cannot tell the polarity of a magnet by this method. The filings simply indicate the direction of the lines of force, but not their polarity. The only reliable method is by using a compass, the N pole of the compass needle being attracted by the S pole of the magnet.

VOLT-AMMETER

(2243.) Charles M. Gardner, California, would like to know:

Q. 1.—What is the E. I. Co.'s price on SPDT, 100 ampere switches for the grounding of aerials?

A. 1.—The 250 volt switch costs $2.25, the 600 volt switch $2.75.

Q. 2.—Does a volt-ammeter read the volts and amperes at the same time if connected to a cell of dry battery or is it adjustable so as to read either the voltage or the amperage?

A. 2.—No, it reads volts or amperes separately, but never both at the same time.

Q. 3.—Please give the wave length of the aerial in the inclosed diagram?

A. 3.—260 metres.

OPERATORS OF DIFFERENT NATIONALITIES

(2244.) C. A. Bilms.New Jersey, writes:

Q.—Kindly advise how wireless operators of different nationalities make each other understand when neither knows the language of the other? Is there an International Code besides the Continental Code?

A.—The continental code is used by practically all operators. This is the international code, and none other is necessary. As long as the operator gets the message as it was sent, that is all that is required of him. It is not necessary that he understands it. He does not have to talk to the other operator. If he wants the message repeated he uses the signal AA, while the signal RD or OK means that he got it. These signals are understood by all operators.

BATTERY MOTOR ON 110 A. C.

(2245.) A. C. Loughray, Missouri. asks:

Q. 1.—How is a small New Departure battery motor, 3 pole armature connected or changed so that it will run on 110 A. C.?

A. 1.—This motor cannot be used satisfactorily on 110 volt A. C. as it heats up badly and the sparking would rapidly destroy the commutator and the brushes.

Q. 2.—Should an arc light (on 110 A. C.)

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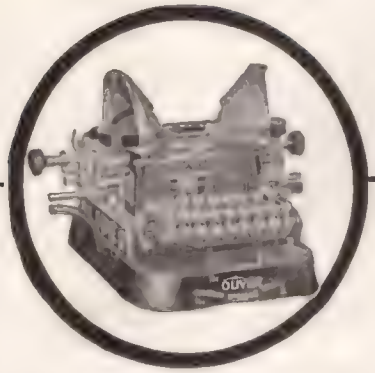

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work better with a Gernsback interrupter or with a water rheostat?

A. 2.—Use the water rheostat. The electrolytic interrupter is useless in connection with an arc light.

Q. 3.—Why will a 1 inch coil not work when the vibrator is screwed up tight (in series with a Gernsback interrupter) and will work when it is adjusted for batteries?

A. 3.—There is probably something wrong with the interrupter.

LOOSE COUPLER WINDING. UNDERWRITER'S RULES FOR POWER WIRING TO WIRELESS TRANSFORMER

(2246.) Harry C. Otten, New York, writes:

Q. 1.—In your book, *"How to Make Wireless Instruments,"* part of the data for a loose coupler calls for No. 36 copper wire on the secondary and No. 22 on the primary. Is this right? Most loose couplers that I have seen, used No. 28 and No. 30 on the secondary and No. 22 or No. 24 on the primary?

A. 1.—You may use practically any size wire you like as there is no fixed rule. With the No. 36 wire you get more on the secondary and can tune to higher wave lengths than when the coarser wire is used.

Q. 2.—Can enameled wire be used with good results on a loose coupler?

A. 2.—Yes, but single silk is better for the secondary and bare wire for the primary.

Q. 3.—As I do not wish to write to the Fire Underwriters until I am fairly sure that my station will pass inspection, I would be very much pleased if you would inform me of anything below that is not up to the rules:—

(A) Regular lamp cord untwisted and run on cleats. This cord is connected and soldered to the wires in the back of a fixture. Where the wires go through a wall, they pass through iron pipe.

(B) In my room the wiring is done with BX.

A. 2.—Your power wiring must be run all the way from the meter to the apparatus either in conduit or in the form of BX cable, otherwise your outfit seems O. K.

WIRELESS STATION ON TENEMENT HOUSE ROOF

(2247.) E. A. Place, New York, asks:

Q. 1.—Is there any law which prohibits us from building a small wireless station about 4½ x 7 feet on our roof which is under tenement house inspectors?

A. 1.—There is no law to prevent you building the station on your roof provided the pent houses already on the roof together with your wireless station will not occupy more than 50 per cent. of the area of the roof. Also the station must be built fireproof and have a stone tile or cement floor.

Q. 2.—Would it be necessary to notify the underwriters before I build said station or would we be able to wait until the start of summer?

A. 2.—It is unnecessary to notify the underwriters before you build the station, but you must notify them and have the station inspected before placing it in operation. You

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A BARGAIN

As you are doubtless aware, the wireless question is settled by act of Congress, and the standing of amateurs is clearly set forth. There will be a great revival in wireless telegraphy this fall; and if you are interested in the subject, you will be glad to know what ELECTRICIAN & MECHANIC will do in this respect.

We have published in our October, 1912, issue, the complete text of the wireless law and the most valuable collection of wireless articles which has been contained in any number for the past year. Future numbers will have full information in regard to the regulations of the government for amateur stations, and instructions for complying with the law, as well as very strong articles on every phase of wireless operation. If you are interested, you will find ELECTRICIAN & MECHANIC an indispensable magazine of reference on wireless telegraphy.

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Q. 3.—Would it be necessary to have a license for the above station as I use a E. I. Co. 1 inch coil for sending? If so kindly state where to obtain same?

A. 3.—Yes. A license will be necessary. See article on this subject elsewhere in this issue.

MECHANICAL INTERRUPTER FOR 110 A. C.

(2248.) Darrell Minkler, Oregon, asks:

Q.—Kindly furnish me with data for making a magnetic interrupter for use on 110 volts A. C. with the E. I. Co. ½ KW. open core transformer coil?

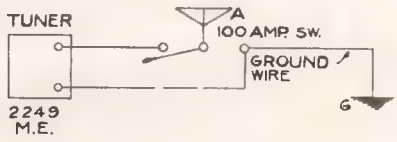
A.—Use a small motor with a toothed wheel mounted on but insulated from the motor shaft. Have a brush so placed that the teeth of the wheel will make contact with the brush when the wheel revolves. Then connect one primary terminal of the coil to the brush, connect the wheel to one side of the 110 volt circuit, and connect the remaining primary terminal of the coil to the other side of the 110 volt circuit through the key.

GROUND WIRE CONNECTION

(2249.) E. R. Wendell, New York, writes:

Q. 1.—Please show me in a drawing how to connect a number 4 B & S gauge wire with my instrument to use as a lightning ground and an instrument ground together in connection with 100 ampere switch?

A. 1.—See diagram herewith.



Q. 2.—What is the nearest wireless station to this city and what is its call and location?

A. 2.—The nearest commercial stations to you are BF and CB in Buffalo.

Q. 3.—Do I need any larger wire than 14 B & S to connect my receiving set?

A. 3.—No.

LOCATION OF "FNK"

(2250.) Ferdinand Thiede, New York, asks:

Q. 1.—Kindly advise me as to any way in which I could notify a wireless station inspector to look over my station?

A. 1.—See article on this subject elsewhere in this issue.

Q. 2.—Also do you know where the station FNK is located in New York?

A. 2.—Bush Terminal, Brooklyn, N. Y.

SAL-AMMONIAC BATTERIES

(2251.) Bernard Plack, Pennsylvania, writes:

Q. 1.—Some time ago I went to the trouble to construct a sal-ammoniac battery of 5 cells. For the elements I employed a battery carbon and a zinc rod, separated about ½ inch, immersed in a saturated solution of sal-ammoniac held in a glass jar. When I connected

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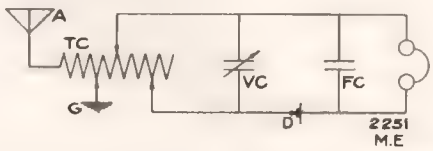
the cells in series my new voltmeter makes no indication whatsoever. What is the trouble?

A. 1.—Either the circuit was open somewhere or you had the batteries connected up wrong or there was something the matter with the voltmeter.

Q. 2.—Kindly give me a hook-up for the following instruments: Brandes 2800 ohm Transatlantic type head set, Murdock three slide tuner, Rotary variable condenser, fixed condenser, ferron detector?

A. 2.—Diagram herewith.



Q. 3.—Should I be able to pick up MCC (Cape Cod) with the above instruments using a four wire aerial 100 feet long and 45 feet high?

A.—Yes.

LAMP ON GLASS PLATE. LENGTH AND FREQUENCY OF ETHER WAVES

(2252.) William J. Clayberg, California, writes:

Q. 1.—In the window of the City Electric Company of this city is displayed an electric light bulb. The bulb is placed on a square piece of glass which is supported on a stool. As glass is a non-conductor of electricity, I would like to know how the electricity is conveyed to the bulb?

A. 1.—This is an old stunt. Fine wires are run along the edges of the glass plate and down the legs of the stool. They are connected at one end to the lamp socket and at the other end to the lighting circuit.

Q. 2.—Who owns and controls the Government wireless stations of America and England?

A. 2.—The United States government stations are owned by the United States government and are operated by the Army and Navy Departments. We do not know about the English stations. Probably some such similar arrangement holds there also.

Q. 3.—How long are ether waves and what is their frequency?

A. 3.—Ether waves for radio communication vary in length from 100 to 8000 metres and their frequency in each case is equal to 300 million divided by their length.

STOCK TICKERS

(2253.) C. J. Sedlaks, New Jersey, writes:

Q. 1.—Give connections for a stock ticker?

A. 1.—Diagram herewith.

Q. 2.—How is the message sent?

A. 2.—Most printing telegraphs used in America are of the class called news or stock tickers. The cut shows the theoretical diagram of ticker having one type wheel. The sending station is at A and one of the receiving stations at B. The line is fed with an alternating current produced by reversing-

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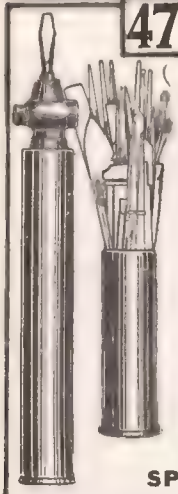

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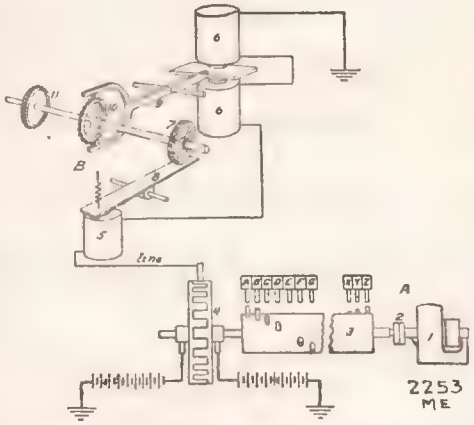
commutator, 4. This alternating current does not affect printing relay, 5, but does operate polar relay, 6, which in turn operates the escapement. Reverser, 4, is driven by constant-speed motor, 1, and has as many segments as there are characters on the type wheel. The escape wheel, 10, is provided with an equal number of teeth, so that each revolution of reverser, 4, will produce one revolution of



type wheel, 7. On the shaft with the reverser is rigidly mounted, a cylinder provided with a number of pins arranged spirally as shown; each pin is in line with a segment of the reverser and also in line with a pin fastened to the key board. Depressing a given key will always stop the cylinder, and therefore type wheel, 7, in the same place. The connection to the motor, 1, is made with a friction clutch, 2, which slips when cylinder, 3, is stopped. Now it is evident if type wheel, 7, is started with its characters in a certain position and is rotated by a motor, through gear, 11, and controlled by escapement magnet, 6, that it will always remain in the same relative position with respect to cylinder, 3, and that the operator can stop the type wheel in any desired position. If the type wheel stops because of the arrest of the cylinder, 3, by depression of a key, the current ceases to alternate, and magnet, 5, has time to draw up its armature, 8, and press the tape against the type wheel, thus printing the character which corresponds to key depressed at the sending station.

Q. 3.—What are the parts of each instrument?

A. 3.—These are shown in the figure.

LIGHTNING GROUND

(2254.) S. Sirignano, Connecticut, writes:

Q.—I understand that it is necessary for my wireless hook-up to be in accordance with the underwriters rules and that I must secure a certificate. Please tell me how I must proceed to get this certificate?

A.—The underwriters rules apply only to the power wiring to your transformer or induction coil and the installation of your lightning switch and lightning ground wire for the aerial. The underwriters' rules on wireless stations were printed in the June issue of *Modern Electrics*. If you have fixed your

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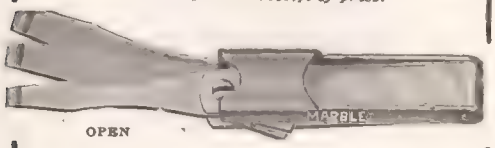

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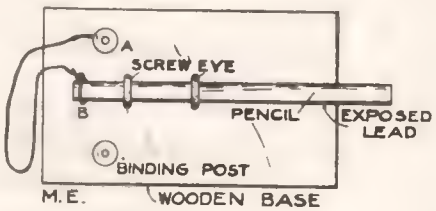
SIMPLE BATTERY RHEOSTAT

(*Continued from page 964.*)

base as shown. Then take the pencil and cut off one side of the wood, exposing the lead. Slip the pencil through the screw eyes, letting the lead make contact with the metal. Attach one end of the conducting cord to the binding post A, and the other to the lead of the pencil at B. One of the screw eyes is connected to the other binding post.



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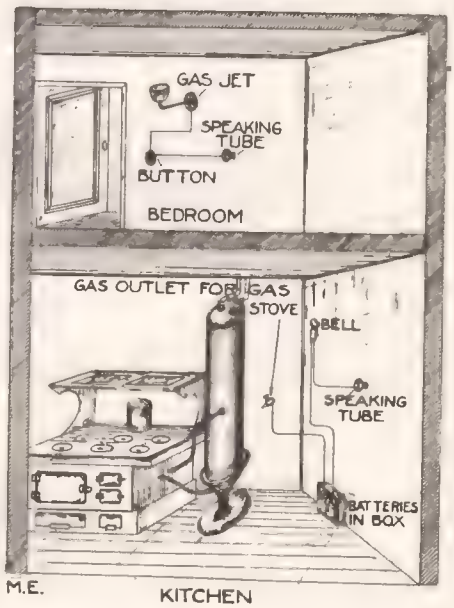

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of wireless. The speaking tube is used as one wire, and the gas or water pipe as the other. I have tried this in two houses with success. In one case from the first to the fourth floor, and in the other from the basement to the third floor. Two ordinary wet or dry batteries will operate the bell this distance, but for best results three should be used.

Contributed by

GILBERT WALKER.

WIRELESS PATENT LITIGATION

The National Electric Signaling Company has been denied its motion for a rehearing on its action for an injunction against the United Wireless Telegraph Company to restrain the latter from an alleged infringement of the Fessenden patent relating to wireless telegraph apparatus. The decision was handed down by the Circuit Court of Appeals at Boston. The rehearing, asked for on the plea that the Court did not understand the invention to which the bill related, was denied, the Court holding that the invention was understood.

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(Insert title of publication) (State frequency of issue)

at.....*NEW YORK*.....required by the Act of August 24, 1912.

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Business Manager, *Orland J. Ridenour, 231 Fulton Street, New York.*
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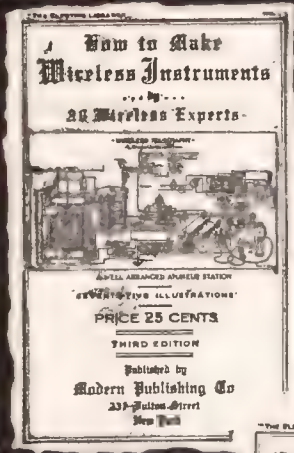

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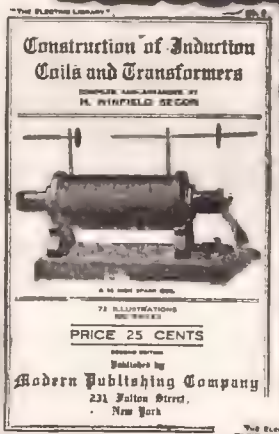

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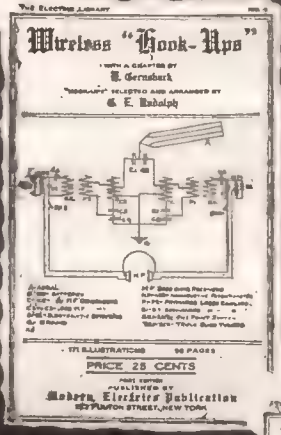

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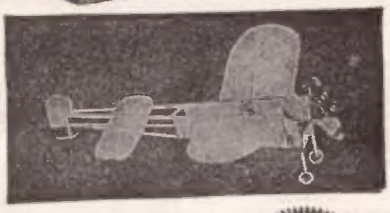

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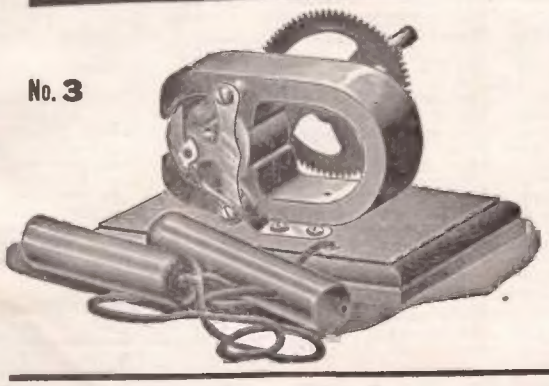

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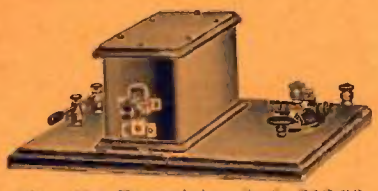

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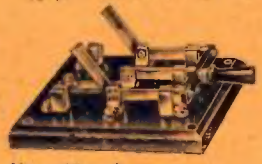

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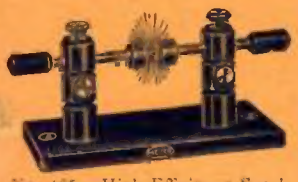

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